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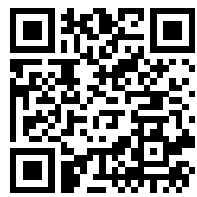

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The Naval Annual

Edited by T. A. BRASSEY

J. GRIFFIN & Co. LONDON & PORTSMOUTH

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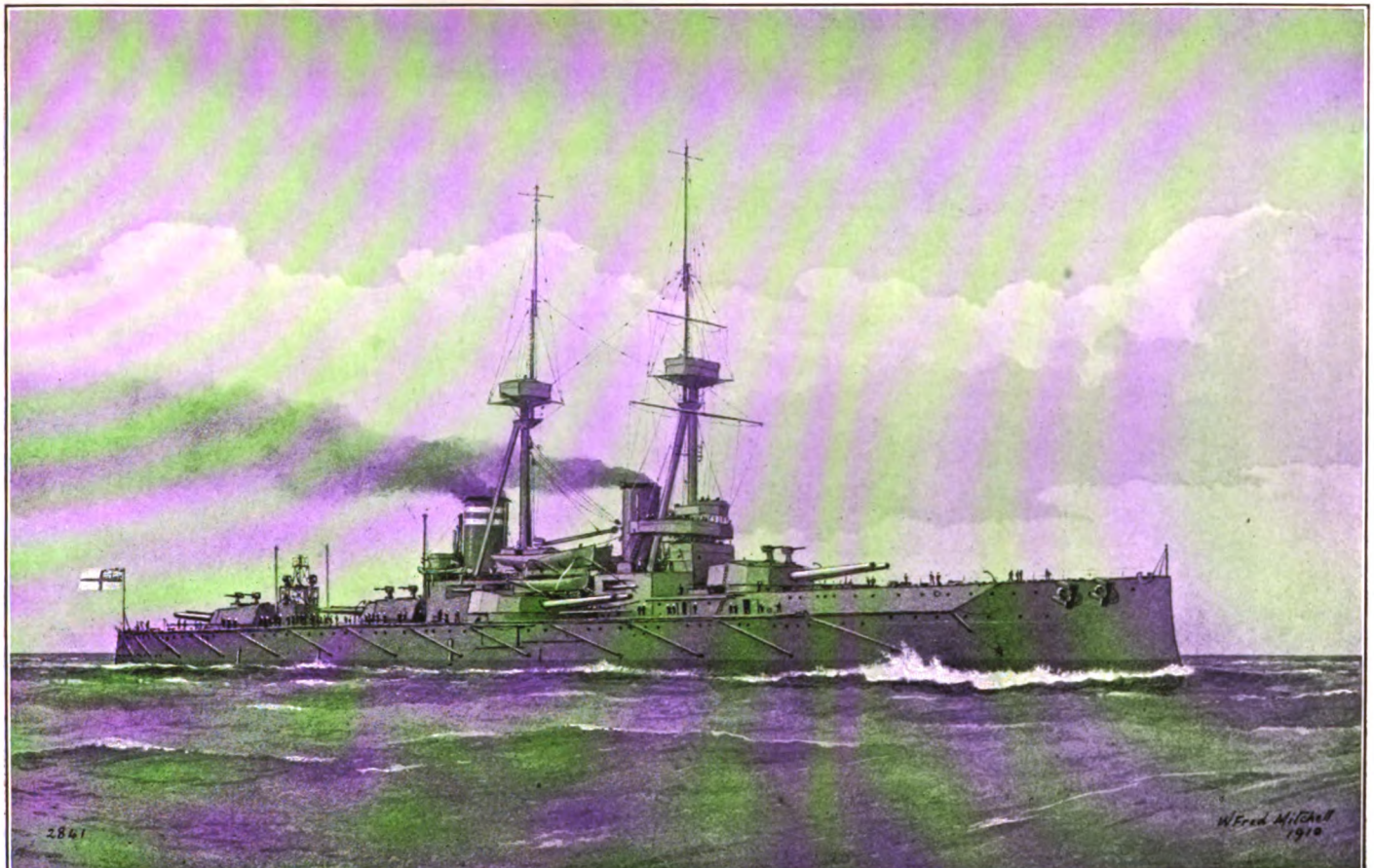

H.M.S. "ST. VINCENT." [*Frontispiece.*

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THE

NAVAL ANNUAL, 1910.

EDITED BY

T. A. BRASSEY, A.I.N.A.,

Honorary Fellow of Balliol; Commander of the Order of the Crown of Italy.

"The possession of a naval force is advantageous to a city. . . . The proper number or magnitude of this naval force is relative to the character of the State, for if her function is to take a leading part in politics, her naval power should be commensurate to the scale of her enterprises."

—Politics of Aristotle. Jowett's Translation.

PART I.—Admiral SIR CYPRIAN BRIDGE, G.C.B.; Vice-Admiral SIR SYDNEY EARDLEY-WILMOT, K.C.B.; Captain ALAN FIELD; JOHN LEYLAND; ALEXANDER RICHARDSON; and the EDITOR.

PART II.—List of Ships: Commander C. N. ROBINSON, R.N., and JOHN LEYLAND.
Plans of Ships: S. W. BARNABY, M.I.N.A.

PART III.—Armour and Ordnance: Commander C. N. ROBINSON, R.N.

PART IV.—FIRST LORD'S MEMORANDUM; BRITISH AND FOREIGN ESTIMATES; LORD BRASSEY ON THE STATE OF THE NAVY.

1910.

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PREFACE.

THE *Naval Annual* for 1910 has been prepared for publication under unusual pressure. Work has had to be done in a few weeks which ordinarily occupies three months, owing to the absence of the Editor during the winter in South Africa.

Part I. contains the usual articles by the Editor on the British Navy and Comparative Strength, but for the reason above given the Review of Foreign Navies has been undertaken by Mr. Leyland, who also contributes articles on the German Navy and the situation between Austria and Italy in the Adriatic. Admiral Sir Cyprian Bridge criticises the proposals for the establishment of a War Council and a Naval General Staff, and Vice-Admiral Sir Sydney Eardley-Wilmot writes on types of warships. Captain Robinson has collected a mass of information as to Colonial resources for shipbuilding, which is of especial interest in view of recent developments. Captain Alan Field, the Superintendent of the Lancashire and National Sea-Training Homes, with the concurrence of Sir John Gray Hill, makes out a very strong case for the extension of this excellent institution in order to provide British seamen for British ships. An article by Sir James Williamson (formerly Director of Dockyards), in reply to the criticisms on Dockyard Administration of Admiral W. H. Henderson, in the *Naval Annual* of 1909, was received too late for publication. It will appear next year. Mr. Richardson's paper on Elements of Speed in Warships will be acceptable to those interested in engineering.

Parts II. and III. remain in the same hands as last year.

Part IV., in addition to the usual matter, contains the reprint of an address delivered by Lord Brassey at Capetown on the State of the Navy, and an abstract of the Projet de Loi for the reorganisation of the French Navy.

The Editor is always grateful to those who will point out errors in the *Naval Annual*. In spite of the care and trouble taken by Colonel Ruggles-Brise and himself to co-ordinate the particulars given in different parts of the volume by different people—in the articles in Part I., in the lists of ships, and on the plans of ships in Part II.—no one is more conscious than the Editor that discrepancies may be overlooked.

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LIST OF BRITISH AND FOREIGN SHIPS.

Commander C. N. Robinson, R.N., and John Leyland.

PLANS OF BRITISH AND FOREIGN SHIPS.

S. W. Barnaby, M.I.N.A.

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Commander C. N. Robinson, R.N.

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Showing the Expenditure on New Construction during the years from 1876-7 to 1909-10 . . . . . *facing page* 413

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PART I.

CHAPTER I.

British Navy.

For the first time for many years the Navy has been dragged into the arena of party-politics. Exaggerated statements were made by the Opposition in Parliament last spring as to the relative weakness of the British Navy, and the attempt to use the British Navy for party purposes was too frequently made during the recent General Election. The position was not so bad as the Opposition endeavoured to make out; though the provision made by the Government for new construction was insufficient. The case, as pointed out by the writer in a letter to the *Times*, March, 1909, at the time that the controversy in Parliament was at its height, would have been adequately met by laying down six, instead of four, battleships during the summer of 1909.

New construction Programme. 1906–7.

Five battleships have been completed in the year under review.

The Temeraire and Superb, sister ships to the Bellerophon (displacement 18,600 tons), were commissioned respectively in May and June, 1909. All these three ships were completed in twenty-eight months or less from the date of laying down.

Programme. 1907–8.

Of the three battleships of the 1907–8 programme (displacement 19,250 tons) the St. Vincent and Vanguard went through their trials in 1909, and the Collingwood in January, 1910. All three ships were commissioned in March. The Vanguard, which was laid down at Barrow in April, 1908, has been completed well under the two years allowed by the contract. The machinery of the St. Vincent was supplied by the Scott Engineering Company, of the Vanguard by Messrs. Vickers, and of the Collingwood by Hawthorn Leslie and Co.

The following particulars (except speed) of trials are taken from *Engineering*:—

Ship.	First Thirty Hours' Trial.		Second Thirty Hours' Trial.		Eight Hours' Full Power Trial.		
	Shaft H.P.	Coal.	Shaft H.P.	Coal.	Shaft H.P.	Coal.	Speed.
Temeraire	4,800	2·8	16,550	1·88	24,600	1·74	22·07
Superb	5,000	2·32	16,900	1·62	25,400	1·38	21·6
St. Vincent	4,880	2·48	17,200	1·68	25,900	1·48	21·7
Vanguard	5,200	2·85	17,600	1·73	25,800	1·63	22·1
Collingwood	4,983	2·84	17,321	1·97	26,319	1.8	21·5

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The mean speed attained on the full-power trials was 21½ to 22 knots. On the trial at seven-tenths power the speed was 19½ knots, and at one-fifth power 13½ knots. The coal consumption of the Superb on the full-power trial, viz., 1·38 lb. per I.H.P. per hour, constitutes a record.

The total cost (including guns) of the dockyard-built ships St. Vincent and Collingwood is set down in the Navy Estimates at £1,754,615 and £1,731,640 respectively. That of the Vanguard is given as £1,607,781—a very large difference in favour of the contract-built ship. It is interesting to note that the Vanguard cost £53,000 less than the Superb—also contract-built.

The following table gives the leading features of the St. Vincent class and the principal battleships completed during the year for foreign navies. All the ships in the table were launched either in 1908 or 1909, with the exception of the Satsuma, which was launched two years earlier. The maximum coal capacity is about the same in all cases, viz., 2500 tons.

—	British. St. Vincent.	German. Nassau.	United States. Delaware.	Brazil. Minas Geraes.	Japan. Satsuma.
Displacement—tons	19,250	18,200	20,000	19,281	19,350
Length—ft.	500	455	510	500	482
Beam—ft.	84	88½	88½	83	83½
Draught—ft.	27	26½	27	25	27½
I.H.P.	24,500	25,000	29,000	27,000	18,000
Speed—knots	21½	20½	21½	21·4	20½
Protection—ins.—					
Belt	10	12–4	11	9–4	9–5
Sides	—	—	10	9–4	8
Guns	9–5	11	11, 5	12–8, 9	9, 6
Armament	10 12-in. 20 4-in.	12 11-in. 12 5·9-in. 16 3·4-in.	10 12-in. 14 5-in.	12 12-in. 22 4·7-in.	4 12-in. 12 10-in. 12 4·7-in.
Cost £	1,754,615	—	—	1,821,400	—

One of the most interesting points in the comparison is that the British ships have a superiority of 1 knot in speed over the German ships, with approximately the same horse-power, showing conclusively the value of length in relation to speed, a question dealt with by Mr. Richardson in a later chapter. The St. Vincent is 45 ft. longer and has 4½ ft. less beam than the Nassau. The former has an advantage in speed of 1 knot with practically the same horse-power. With the exception of the Japanese Satsuma, all the ships in the table have a main armament of ten or twelve big guns. It is claimed in Germany that the 11-in. gun is equal in power to our 12-in. gun, but it is doubtful whether this claim is justified. The Minas Geraes, with her broadside of ten 12-in. guns, has the most powerful main armament of the ships in the table.

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The British ships built since the Dreadnought carry no secondary armament whatever. The 4-in. guns mounted on the superstructure and on the tops of the turrets are intended to meet the attack of torpedo-boats, and few, if any, of them would be available for this purpose after an action. The Nassau class carry a powerful secondary battery of twelve 5·9-in. guns mounted amidships behind armour on the main deck. The Delaware carries ten 5-in. guns similarly mounted, in addition to four 5-in. guns mounted in casemates on each bow and on each quarter. The Minas Geraes carries fourteen 4·7-in. guns behind 9-in. armour on the main deck. Of the twelve 4·7 guns carried by the Satsuma, eight are distributed on the main deck between the 12-in. gun-turrets, and protected by 6-in. armour. If it were certain that actions could always be fought at long range, the absence of a secondary armament in British ships would not much matter; but the probability is that occasions will arise when, owing to weather conditions or in order to make an action decisive, close range will be imperative, and on such occasions the broadside fire of six 6-in. guns, making twenty-four hits a minute (the average number of hits per minute made by 6-in. guns in the Gunlayers' Test of 1908 was four), might have a serious influence on the result of an action.

Only two armoured ships were provided for in the 1908–9 programme. The battleship Neptune was laid down at Portsmouth on January 19th, 1909, and launched on September 30th. Displacement, 20,000 tons; length, 510 ft. between perpendiculars; beam, 85 ft.; draught, 27 ft.; shaft H.P., 25,000. The machinery of the Neptune is being supplied by Messrs. Harland and Wolff. The Neptune carries an armament of ten 12-in. and sixteen 4-in guns and three submerged torpedo-tubes. The main armament is mounted in pairs in five turrets, but these are differently distributed to those of her predecessors. The two side turrets are placed in échelon. The middle turret is placed immediately forward and above the after turret. This disposition admits of all the 12-in. guns being fired on either beam, while eight guns are available for stern fire and six for bow fire.

Programme, 1908–9.

Neptune.

The cruiser-battleship Indefatigable was laid down at Devonport in February, and launched on October 28th, 1909. Displacement, 18,750 tons; length, 555 ft.; beam, 80 ft.; I.H.P., 45,000; speed, 26 knots. The machinery is supplied by John Brown & Co. The total estimated cost of the ship including guns is £1,547,426, while the dockyard-built battleship Neptune will cost £1,728,449.

Indefatigable.

The battleship Colossus, laid down on July 8th, 1909, at Scott's Yard, Greenock, and the Hercules, laid down on July 30th at Palmer's Yard, Jarrow, belong to the Neptune class. The following particulars of the Orion, laid down at Portsmouth on November 29th,

Programme, 1909–10.

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are given with reserve. Displacement, 22,500 tons; length, 545 ft.; beam, 88¼ ft.; draught, 27½ ft.; I.H.P., 27,000; speed, 21 knots. The five turrets will be all on the centre line, and will be armed with 12-in. guns, although there seems no reason, in the view of naval engineers, why the same mountings should not suit guns of larger bore, although not of the same length.

In the following table are brought together particulars that have been published of the latest foreign battleships* laid down or proposed, which it may be interesting to compare with the few particulars of the Orion given above. They must, in nearly every case, be accepted with reserve. The United States, German, Japanese and Argentine ships have a good secondary battery of 6-in. guns. The Italians and Russians, if the figures given are correct (and they are probably correct for the Dante Alighieri), have gone in for speed, and as a consequence have had to be content with 4·7-in. guns.

	United States.	German.	Japan.	Russia.	Italy.	Argentina.
Ship	Wyoming.	Thüringen.	Settsu.	Sevastopol.	Dante.	Moreno.
Displacement	26,000	22,000	20,800	23,000	21,500	28,000
Length—ft.	554	490	480	590?	490	578
Beam—ft.	93¼	90	84	87	—	95½
I.H.P.	28,000 (tur.)	22,000	26,500	42,000 (tur.)	30,000	39,500
Speed—knots	20½	20	20½	23	23	22½
Protection—						
Belt	11-9	12-4	12-9½	—	—	12-10
Sides	—	—	—	—	—	9-6
Guns	11	—	—	—	—	12, 6
Armament	12 12-in. 21 5-in.	12 12-in. 14 5·9-in. 20 4·1-in.	12 12-in. 10 6-in. 12 4·7-in.	12 12-in. 16 4·7-in.	12 12-in. 18 4·7-in.	12 12-in. 12 6-in. 16 4-in.
Coal Maximum	2,500	—	—	3,000	—	4,000
Complement	1,115	—	—	—	—	1,100

Admiral Bacon, in a paper read at the spring meeting of the Institute of Naval Architects, predicted a further increase in the size of battleships as the best means of increasing the possibility of surviving the blow of a torpedo. He suggested that battleships would no longer act in fleets, but that each battleship would be a unit in herself with her own flotilla of destroyers. His views were severely criticised by the naval officers present.

The cruiser-battleship Lion was laid down at Devonport on November 29th. The following particulars must be accepted with reserve. Displacement, 26,350 tons; length between perpendiculars, 660 ft.; overall, 700 ft.; beam, 88 ft. 6 in.; draught, 28 ft.; shaft

* Proposed French battleships have a displacement of 23,100 tons; armament, twelve 11·8-in., twenty-two 5·5-in.; speed, 20 knots.

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H.P., 70,000; speed, 28 knots; armament, eight 12-in. and sixteen 4-in. B.L. guns.

The contracts for the four contingent ships of the 1909–10 programme have been awarded as follows:—The Monarch to Messrs. Armstrong, Whitworth & Co.; the Conqueror to Messrs. Beardmore; the Thunderer to the Thames Ironworks; and the Princess Royal to Messrs. Vickers, Sons & Maxim. The three first will be battleships; the ship to be built by Messrs. Vickers will be a cruiser-battleship of the Lion type. All four ships are to be rapidly advanced during 1910–11.

Colonial cruiser-battleships.

The orders for the two cruiser-battleships to be built at the cost of the Commonwealth of Australia and Dominion of New Zealand have been placed by the Admiralty with Messrs. John Brown & Co., Clydebank, and with the Fairfield Shipbuilding and Engineering Company.

Cruisers.

The third-class cruisers Boadicea and Bellona have attained a speed of nearly 26 knots on trial, as against the 25 knots estimated, the mean coal consumption being 1·27 lb. per shaft H.P. per hour, which is extraordinarily moderate. The Boadicea was commissioned in June, 1909, and the Bellona somewhat later. A third cruiser of the same class, the Blanche, was laid down April 12th, 1909, and launched at Pembroke on November 25th, while a fourth, the Blonde, was laid down at Pembroke on December 6th.

Bristol class.

Of the second-class protected cruisers (4800 tons displacement), the Newcastle, laid down at Elswick in April, was launched on November 25th, 1909; the Glasgow, at Fairfield, on September 30th; the Liverpool, at Barrow, on October 30th; the Gloucester, at Dalmuir (Messrs. Beardmore's Yard), on September 28th, and the Bristol, at Clydebank, on February 23rd, 1910. The estimated speed of these vessels is 25 knots with 22,000 I.H.P. Armament two 6-in. and ten 4-in. guns. One of the 6-in. guns will be mounted on the forecastle, the other on the upper deck aft. The 4-in. guns are mounted in the waist. An arched steel-protected deck extends the full length of the ship. The three first-named vessels, which are to be driven by Parsons turbines, are quadruple screw. The Bristol, which has Curtis turbines, has only two propellers. It is expected that all will have completed their trials by July.

Weak armament.

The weak point of the Bristol class is the armament, which is very poor for cruisers of nearly 5000 tons displacement, and compares unfavourably with the present armament of the Eclipse class (eleven 6-in. guns), of the German Hansa class (two 8·2-in. and eight 6-in.), which are only 600 to 800 tons larger. It may be doubted whether the Bristol could even fight a merchant-cruiser armed with ten or twelve 6-in. guns. Speed is doubtless a valuable

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element for a cruiser intended for the protection of commerce; but it may be too dearly purchased. It is useless to be able to overtake your enemy if you cannot fight him when you catch him.

The contracts for the four similar cruisers of the 1909–1910 programme have been awarded as follows:—the Dartmouth to Messrs. Vickers, Weymouth to Messrs. Armstrong, Falmouth to Messrs. Beardmore, and Yarmouth to the London and Glasgow Shipbuilding Company (Govan). The last-named will have Curtis turbines; the others Parsons turbines. The displacement of the new second-class cruisers is 5250 tons, or 450 tons more than that of the Bristol. The estimated speed is the same, viz., 25 knots, but the armament comprises eight 6-in. guns, a very great improvement on that of the Bristols.

Swift. The large torpedo-boat destroyer Swift, which was largely an experimental vessel, of 1800 tons, has been accepted from her builders, Messrs. Cammell, Laird & Co., Ltd., the speed attained being 35¼ knots, which is rather less than the rate expected. The designed displacement is reported to have been considerably exceeded. The Swift has cost £241,000, and carries four 4-in. guns. She represents a type which is most unlikely to be repeated.

Destroyers. The Afridi, of the 1905–6 programme, the Amazon and Saracen, of the 1906–7 programme, and four destroyers of the 1907–8 programme, the Nubian, Maori, Crusader and Zulu, have been completed. These four destroyers are of 985 to 1045 tons displacement. The Stour and Test, which were bought to replace two vessels lost, are of 566 tons displacement.

Engineering gives the following results of the trials of destroyers:—

Saracen	33·1 knots	J. S. White.
Nubia	34·7 „	Thornycroft.
Maori	33·2 „	Denny.
Crusader	34·8 „	J. S. White.
Test	25·6 „	Cammell, Laird.
Stour	25·6 „	„

Ten destroyers of the 1908–9 programme (900 to 950 tons) are still under construction, and should be completed by September of this year.

The contracts for the twenty destroyers of the 1909–10 programme, in which the displacement has been reduced to 780 tons, have been awarded as follows:

John Brown & Co.	Clydebank	3	(Acorn, Alarm, Brisk).
Fairfield & Co.	Glasgow	3	(Cameleon, Comet, Goldfinch).
Denny Bros.	Dumbarton	2	(Sheldrake, Staunch).
A. & J. Inglis	Glasgow	1	(Fury).
Hawthorn Leslie & Co.	Newcastle	3	(Nemesis, Nereide, Nymph).
Swan, Hunter & Wigham Richardson	Newcastle	1	(Hope).
Thornycroft	Southampton	4	(Larne, Lyra, Martin, Minstrel).
J. S. White & Co.	Cowes	3	(Redpole, Rifleman, Ruby).

The absence of the firm of Yarrow from the list is noteworthy.

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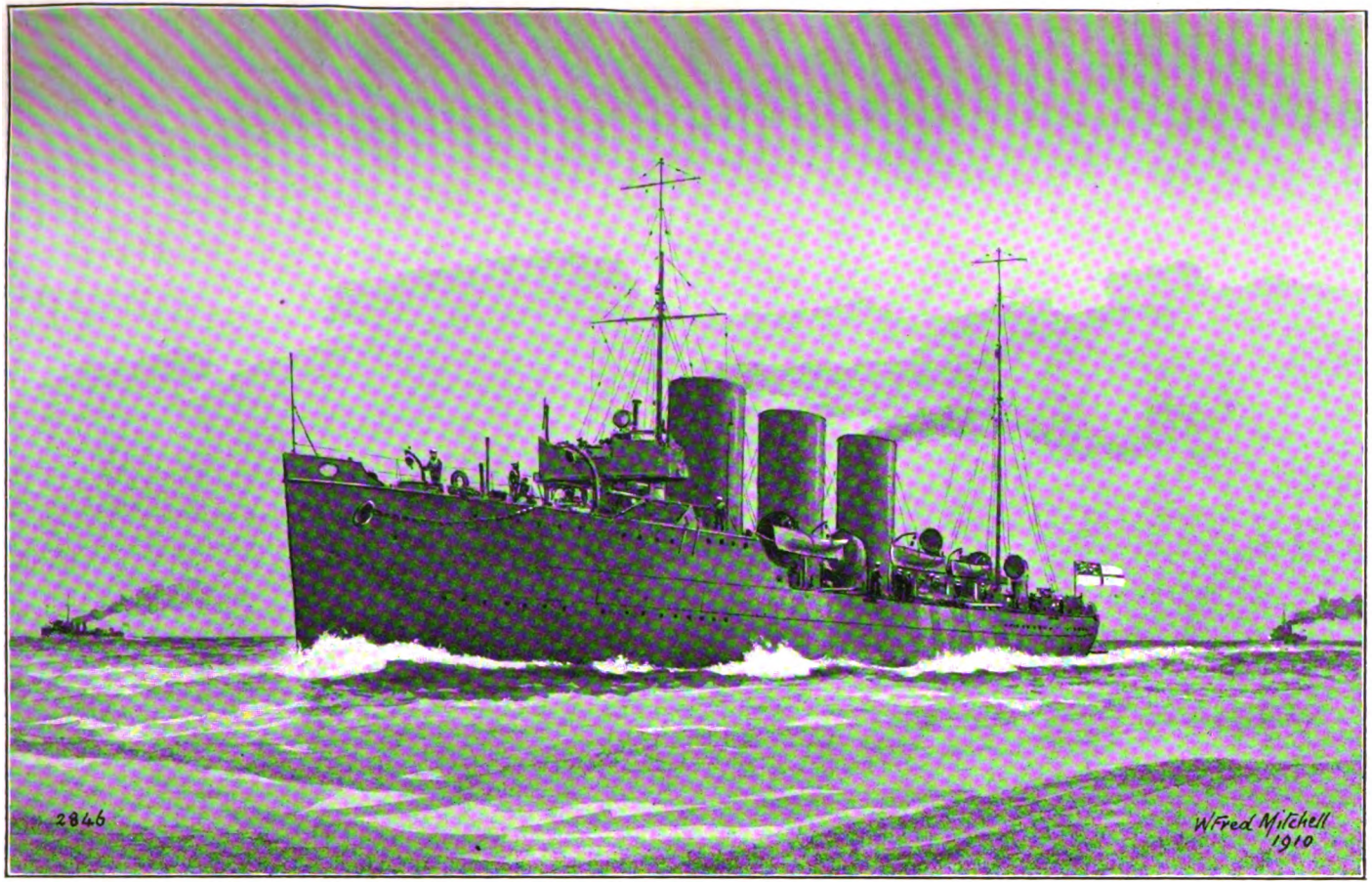

H.M.S. "SWIFT."

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D 1, of a new type (displacement 600 tons), has been completed by Messrs. Vickers, whilst sixteen boats of the C type, viz., C 17–32, of 321 tons displacement, have also been completed. Submarines.

The progress of Naval Works is given in detail in the First Lord's Statement. The dockyards at Simon's Bay * and Hongkong, the breakwater at Malta and Dover Harbour, have been completed. In the *Naval Annual* of 1903 appeared an article on Naval Works, with plans and descriptions of the works proposed under the Naval Works Act of 1901, including those above mentioned, and with some criticism of the expenditure proposed in certain cases. The writer visited Simon's Bay in January. The dockyard has been completed more easily than was expected. In time of peace, and with the present small squadron on the Cape Station, there is little use for this dockyard. In time of war it may be invaluable. Naval Works.

A noteworthy feature of the year was the number of naval reviews. These took place at Spithead in June, on the occasion of the Imperial Conference; in the Thames during July, for the purpose of giving Londoners an object lesson in naval power; and at Cowes in August, on the occasion of the visit of H.I.M. the Czar of Russia. The naval manœuvres were held shortly after the review at Spithead. In addition to the first two divisions of the Home Fleet and the Atlantic Fleet, the third or nucleus crew division and the fourth or skeleton crew division of the Home Fleet were mobilised, and the Mediterranean Fleet was brought home to take part. Upwards of 20,000 men were required to complete the crews of vessels to full commission. Reviews and manœuvres.

—	Battle-ships.	Armoured Cruisers.	Protected Cruisers.	Scouts.	Destroyers.
Home Fleet—1st Division	8	5	2	2	24
" " 2nd "	8	5	2	2	24
" " 3rd "	8	9	7	4	69
" " 4th "	4	..	9		
Atlantic Fleet	6	4	2	..	..
Mediterranean Fleet	6	4	4	..	..
	40	27	26	8	117

In addition to the above seventy-nine torpedo boats, twenty-six submarines, besides torpedo gunboats, minelayers, depot and repair ships took part in the manœuvres, making a grand total of over 350 vessels.

* Total expenditure, £27,501,864. The estimated cost of the works now completed was as follows:—Simon's Bay Dockyard, £2,500,000, in addition to £1,000,000 for coaling facilities; Hongkong Dockyard, £1,275,500; Malta Breakwater, £1,000,000; Dover, £3,500,000.

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The despatch of the Second Division of the Home Fleet to the old winter quarters of the Channel Fleet at Vigo and Arrosa Bay deserves to be mentioned. Greater efficiency will be secured by this return to old practice than by keeping the Fleet tied to the British coast, the crews frequently broken up by week-end leave, a source of great expense to officers and men.

avy aff.

The question of a Naval Staff and War Council is discussed at length in a later chapter. The agitation in favour of the creation of a special class of officers for staff duties in the Navy ignores the fundamental difference between naval and military organisation. There is no evidence whatever that staff duties in the Navy have not been efficiently performed up to the present. Opinion in the British, German, and, probably, also in the Japanese Navies, is opposed to the creation of a special staff. Officers are better fitted for staff duties by serving in a fleet than by being attached to a Naval Staff College ashore. As regards the creation of a War Council, Sir Cyprian Bridge points out that the wars of the past have been well conducted under the then organisation and the responsibility of the Board of Admiralty. That there should exist, in times of peace, a body of officers for the study of strategical problems, especially those which are partly naval and partly military in character, is probably desirable; but it would be a grave mistake if any step were taken which would impair the responsibility of the Admiralty in time of war. An improvement in the War College would seem to meet the case.

The present scheme of entry for officers.

As the midshipmen entered under the new scheme of entry for the Executive, Marine and Engineer branches of the Service are drawing nearer to the time when they will become sub-lieutenants and have to specialise, some anxiety arises as to how this scheme is going to work out in practice. It can hardly be supposed that any officer will select the Marine branch, with its poor prospect of employment for the senior ranks, unless he can revert to the Executive branch on the conclusion of a commission. Interchangeability between the Executive and Marine branches for officers opens up the whole question of the future of the Marines. Is the force to be maintained on its present footing? As regards the Engineering branch, the system of interchangeability between the Executive and Engineering branches has apparently worked fairly well in the United States, but it is difficult to believe that a commission spent in the engine-room is a good school for the development of the highest qualities required in the naval officer, whether in command of a ship or a fleet. As far as can be gathered, few of the midshipmen or naval cadets entered under the present

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system will select the Engineering branch from choice, though the percentage may possibly be sufficient to meet requirements. If it is not, the scheme will have substituted unwilling engineers for the old class of engineers who entered at Keyham because they had a liking for the profession. The present scheme, as pointed out in these pages when it was first introduced, was good, in that it compelled the naval officer of the future to acquire a sufficient knowledge of engineering to enable him to effectively command his ship, but the difficulty of working out the scheme in practice alluded to above requires, and is no doubt receiving, the serious consideration of the authorities.

Gunnery.

In the Gunlayers' Tests, of which some figures are given in Part IV., there is an improvement in results with the 12-in., 9·2-in. Mark XI, the 6-in. B.L., and the 4-in. guns. There is a slight falling off in the hits per minute scored by the 7·5-in., the 6-in. Q.F., and the 4·7-in. Q.F. guns. The Battle Practice shows an improvement in the average number of points scored per ship. The ships of the Home Fleet, and especially the Natal, show up well in the gunlayers' test. No ship has secured the number of points scored last year by the Indomitable in Battle Practice. There are extraordinary differences between the performances of different ships and groups of ships with the same gun, accounted for partly, no doubt, by the difference in conditions when the tests were carried out. The *Naval and Military Record* draws attention to the fact that the 9·2-in. guns of the Agamemnons were less than one-third as effective as those of the Warriors, and less than half as effective as those of other armoured cruisers and the King Edward class.

Boom defence.

The old destroyer Ferret in July broke through the Portsmouth Harbour boom defence with the greatest ease and without sustaining any damage.

Estimates, 1910–11.

The Navy Estimates for 1910–11 amount to a total of £40,603,700, as compared with £35,142,700 for 1909–10, or, including the Supplementary Estimate * presented last February, to £35,831,800. The expenditure on the Navy has never previously approached these figures. In 1904–5 the Navy Estimates amounted to £36,859,681, the highest figure attained up to the present. In the four succeeding years they ranged from £31,251,156 to £33,151,841. The principal increases are under Votes 1 and 2 (wages, victualling and clothing), about £200,000; Vote 8 (shipbuilding), about £4,600,000; and Vote 9 (naval armaments). The Naval Works vote is increased

* Amount £689,100, viz.: Increases on Vote 8 (New Construction), £880,000, and Vote 9 (Armaments), £86,000; abatements on Vote 1 (Wages), £50,000, and Vote 10 (Works), £176,900.

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by £79,000, and the Non-effective votes (half-pay, pensions, etc.) by £114,600.

Personnel. The numbers of the *personnel* (Vote A), which for the past three years have remained stationary at 128,000, are to be increased to 131,000. This increase is said in the First Lord's Memorandum to be "due in part to a revision of the scheme of complement of ships of war, in order to fit them for the needs of modern warfare, and in part to the requirements of new ships now being placed in commission or under construction." That the complements of existing ships of war should require to be increased was explained by the First Lord in the House of Commons to be partly due to the adoption of cooling arrangements for magazines. The numbers voted for sea-service are 124,421, a net increase of 2686, the increase of over 3000 in naval ratings being compensated by a reduction of 147 in the Coast-guard and 418 in the Royal Marines. There is an increase of six in the number of Naval Cadets, and of 505 in the number of boys under training.

The numbers voted for the Reserves of all classes stand at 58,521, as compared with 57,686 voted in the previous year, though the numbers borne on January 1st, 1910, viz., 56,328, were considerably below this figure. The depletion of the Royal Naval Reserve at home is to be rapidly continued. The numbers voted have fallen from 20,200 to 18,500, making a decrease of over 6000 in the last three years. The First Lord speaks highly of the value of the new system of training in the Home Fleet. The inconvenience of this system to officers and men as compared with training in drill ships distributed at various ports is partially responsible for the falling off in numbers. The Naval Reserve in Australia shows a small increase. There is an increase of 11,150 men in the Fleet Reserve, which now stands at 24,100 men. Class A (Pensioners) is reduced by 400 men, while Class B (Non Pensioners) is increased by 1550 men. There is an increase of about 800 men in the Pensioner Reserve. The increases in the Fleet and Pensioner Reserves about make good the falling off in the Naval Reserve. The Naval Volunteer Reserve has increased by 400 men, and was on January 1st over its establishment. New companies have been authorised at Newhaven and Greenock.

New construction. The sum provided for new construction (Vote 8) is £13,279,830, as compared with £8,885,194 last year—an increase of about £4,400,000. It exceeds by over £2,000,000 the largest sum ever spent on new construction (in 1904–5). As pointed out by the First Lord in his Statement, a very large proportion—more than seven-eighths—will be spent on ships already in hand, including the three contingent battleships and Princess Royal, which will each absorb

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about £950,000. The new programme includes five large armoured ships (two to be built in the dockyards and three by contract), five protected cruisers, and twenty-three destroyers, besides the commencement of ten submarines estimated to cost when completed £750,000. A considerable number of miscellaneous craft, such as submarine tenders, tugs and yard craft, are to be laid down, while the construction of two floating docks, on which about £170,000 is to be spent, is a new feature of the programme.

This programme has been criticised as a paper programme, and the criticism is not unjustifiable. On the two dockyard-built armoured ships £96,700 a-piece will be spent; on the three contract-built armoured ships from £38,000 to £48,000 will be spent. As instalments for the contract-built ships do not fall due till some time after the expenditure has been made, the actual amount expended on them will be larger than that set down. These five ships cannot be laid down till the last quarter of the financial year. The First Lord states that they will be laid down in January, 1911, and that they are to be completed by March, 1913. Of the five protected cruisers three will be built in the dockyards and two by contract. On one of the former £122,000 is to be spent, so that the ship will be seriously advanced; on the remainder only from £30,000 to £53,000 apiece will be spent, so that little progress will be made on them before the close of the financial year. The destroyers will be built by contract, while of the submarines, two will be built at Chatham Dockyard and eight by contract, presumably by the Vickers Company. The question whether the above programme of armoured construction may be considered sufficient for our needs is examined at length in the chapter on Comparative Strength. The amount proposed for new construction is very large; but the expenditure must be faced if we are to keep the command of the sea. It is better to press rapidly to completion vessels already in hand than to spread the same expenditure over a larger number of vessels progressing more slowly. That the former is the policy being pursued by the Admiralty is clear from the fact that £950,000 apiece is to be spent on the four contingent armoured ships during 1910–11. On the same reasoning it might be better to lay down two battleships earlier in the year than to commence five towards the end.

Colonial Navies. Australia and New Zealand.

The placing of the orders for the two cruiser-battleships (to be built at the expense of Australia and New Zealand), under the arrangements come to at the Imperial Conference (the summoning of which was strongly urged in these pages last year), in August, 1909, has already been mentioned. The history of events leading up to this

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Conference and some account of Colonial resources for shipbuilding are dealt with by Captain Robinson in a later chapter. Under these arrangements the New Zealand Government, holding firm to the view that the Navy, which has to defend the Empire, should be under one undivided control, presents a cruiser battleship to the British Navy, which will be the flagship of the China unit of the Eastern Fleet. In Australia other views have prevailed. The Australian unit of the Eastern Fleet is to consist of one cruiser battleship, three second-class cruisers, six destroyers and three submarines. Of the six destroyers three were under construction early last year. One of these has been launched, and all three should be completed by the end of 1910. The whole of the above programme, including the New Zealand cruiser battleship, is to be carried out by the summer of 1912. The Commonwealth Parliament has passed the Australian Naval Defence Loan of £3,500,000.

Canada. Canada is proceeding on more independent lines to the creation of a navy. A naval service is to be organised on the lines of the Canadian Militia Act, with a permanent force, a reserve, and volunteers. A third-class cruiser has been already purchased from the Admiralty for training purposes. It is proposed to build two cruisers of the Bristol class, two of the Boadicea class, and six destroyers—the sum to be spent this year being £1,200,000 in round figures. The original intention was to build the ships in Canada, though the cost of construction may be 30 per cent. more than if they were built in the Mother Country and though the Canadian shipyards have yet to be created. That Canada should desire to establish a shipyard in the Dominion is natural; but that at the present stage the Canadian Government should decline to give employment to British workmen, in spite of the extra cost and delay consequent on building in Canada, is regrettable. Under the Naval Defence Act which has been passed by the Canadian Parliament, the Government can place the Canadian Navy at the disposal of the Admiralty for general service with the Royal Navy in case of emergency—emergency being interpreted by Sir Wilfrid Laurier as: "War anywhere. If Great Britain is at war, then Canada is liable to invasion, and Canada is at war." The naval policy adopted by the Canadian Government was vigorously criticised in Parliament by Mr. Borden, the leader of the Opposition, in the country, and in the press. A desire was widely expressed, notably by the Premier of Manitoba, that Canada shall not limit herself to provide for her own local defence, but should do something substantial to assist the taxpayers of the Mother Country in providing for the general defence of the Empire.

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South Africa.

Whether South Africa will adhere to the policy of direct contributions to the Imperial Navy hitherto adopted by the Cape Colony and Natal is a question which cannot be settled till the Union Parliament is in existence. South Africa is only just emerging from a period of depression and, though the prospects of a great development in the future are bright, cannot afford to do very much for the present. The Cape Squadron needs strengthening, and an arrangement should be possible for doing this with the financial assistance of the South African Union.

Conclusion.

The establishment of Colonial navies is an important new departure from hitherto accepted principles, and is a recognition of the fact, often pointed out in these pages and elsewhere by the present writer, that the burden of defending our Empire is becoming too heavy for the taxpayers of the Mother Country alone. A single Imperial Fleet under one control, towards the maintenance of which all parts of the Empire contribute, is the ideal as well as the cheapest and most efficient plan of defending the Empire at sea. It was open to the objection that the outlying Dominions had no voice in the control of Imperial policy or of the expenditure to which they contributed. Under the existing constitutional arrangements of the Mother Country it is impossible to give the Dominions any voice in control. The plan that has been adopted with regard to the Australian unit is probably the best that could have been devised to meet Australian opinion, and it is to be hoped that Canada will in time come into line and take a larger view of her responsibilities. It is improbable that either Australians or Canadians have any idea of the costliness of the undertaking to which they are now committed if their local navies are to be kept efficient.

This review of the progress of the British Navy cannot be concluded without recording the retirement of Admiral-of-the-Fleet Lord Fisher, to whose energy and initiative are largely due the many important changes in naval administration which have taken place during the past few years. The appointment of Admiral Sir Arthur Wilson to succeed Lord Fisher as First Sea Lord has been received with immense satisfaction in the Navy, as well as by all those interested in the maintenance of the best traditions of the Service.

T. A. Brassey.

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CHAPTER II.

Foreign Navies.

France.

Since the last volume of the *Naval Annual* was published several important circumstances have occurred which promise to exercise a considerable influence on the future of the French Navy. It has been subjected to the investigation of a Parliamentary Commission, which revealed the extent of the administrative failure and some of the causes of that failure; it has been brought under the direction of an able Minister who is a seaman, coming after a long succession of civilians, and, as a consequence, has been subjected to a series of far-reaching reforms; and finally an organic law for its expansion, generally on the lines of the German Navy Law, has been presented to the Chambers. Although enormous difficulties remain to be surmounted as the result of past mismanagement and of a faulty system, and there is some disappointment at the limited character of the organic programme, a certain feeling of cheerfulness prevails, and the marks of progress are evident.

Deficiencies of the Navy.

In March, 1909, the late Minister of Marine, M. Picard, brought before the Chamber what was called the "Bilan de la Marine," in the form of a memorandum, in which were set forth the sums required for the following objects: (1) to complete the necessary stocks of guns, projectiles, and powders, and proper reserves of these stores; (2) to modernise the plant at the dockyards, so that they should be fitted to berth, dock, and repair existing ships, and assure rapidity of mobilisation; (3) to accelerate the construction of vessels in hand, as well as work on certain reconstructions which were necessary or had been provided for, such as the reduction of superstructures and the refrigeration of magazines; and (4) to increase the stores and requirements at the yards and magazines to meet the demands of the Fleet, and more especially of the vessels which had been included in the programme. The sums estimated to be required to make good these deficiencies were as follows: ordnance supplies, £3,833,000; docks and other works at the yards, £1,762,000; naval construction, £1,476,000; general stores, £672,000. This statement was brought before the Chamber in connection with a demand for a supplementary vote on account for

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1909 to meet urgent requirements, very largely under the head of ordnance, the sum asked being £1,200,000.

A Commission of Inquiry appointed.

The presentation of this statement appeared to M. Delcassé to be the confirmation of a lamentable situation, and he accordingly moved the Chamber to appoint a Commission of Inquiry which should measure the evil, ascertain the causes, assign the responsibilities, and sanction the remedies. It was naturally to the Navy, that is to the naval department, that the execution of what was determined would be entrusted, "mais à la marine préalablement refondue, réorganisée." The Commission asked for was forthwith appointed, with M. Delcassé as its president, and Admiral Bienaimé and MM. Gustave Chappuis, Colliard, Paul Bignon, and Massé as its vice-presidents.

Report of the Commission.

The Commission entered upon its duties without delay. Its members visited the dockyards and the Fleet, heard a good deal of evidence, returned to Paris, called for papers, and finally charged M. Henri Michel, who is a deputy, and also editor of the *Marine Française* (*Organe de la Démocratie Maritime*), which has always been a severe, if not always a judicious, critic of the naval administration, to prepare a report, which was presented in June, in the form of a volume of 220 pages, while the evidence, which had been published previously, covered not less than 730 pages. The conclusions were as follows:

Naval construction.

During the last ten years the Chambers had been asked to authorise the construction of ships, for which in many cases plans had not been definitely prepared. Months and often years had elapsed between the contracts for parts of ships, the hulls, turrets, boilers, &c., entailing considerable loss of time and of money. This had been the case especially with battleships of the Patrie class and the armoured cruisers Ernest Renan, Edgard Quinet, and Waldeck-Rousseau, and numerous and important changes had been introduced in the course of construction, particularly in regard to the armament of the battleships Justice, Démocratie, Liberté and Vérité, and of the armoured cruisers named. While the Gloire was on the stocks she was lengthened, her displacement increased, and her armament and machinery designed afresh. During the building of the Justice she was the subject of fourteen different acts, entailing two hundred various modifications. Apart from increase of expenditure and retardation of construction, the result of such procedure was to impair that homogeneity which is the supreme quality of a squadron. Most of these defects were aggravated in the case of the six battleships of the Danton class, the original contract for which, signed at the end of December, 1906, had undergone hundreds of modifications, which must now be placed on a proper basis. The Commission proposed to the Chamber to censure severely proceedings of this sort which, while prejudicial to the public finances, were incompatible with any kind of rational, methodical, or rapid construction; and to decide that henceforth it would not authorise the construction of any ship before it had assured itself that the plans—at least, as regards the essential parts—had been definitely decided, and that the contracts were ready for signature.

Dockyards.

On the subject of dockyards the Commission reported that the yards were not in a state to carry out with rapidity new construction and repairs. The plant and mechanical equipment were in general inadequate and out of date; the abolition of piecework, which had coincided with a reduction of working hours and the diminution of the powers and authority of the superintendents in charge, had resulted in a considerable lessening of production, and lack of material sometimes entailed a stoppage of work. The Commission therefore proposed to the Chamber to decide that, in the interests of the Navy, as well as in those of finance, the dockyards and naval workshops should be supplied with an equipment which would enable them to obtain the *maximum* of production in the *minimum* of time; that measures should be taken to ensure that eight full hours of work were done; that there should be, as

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far as possible, a general reintroduction of piecework, distributed and remunerated in an equitable manner. The abolition of piecework had been brought about in 1903 by M. Pelletan, the Socialist Minister, who had also introduced the eight hours' day, and the system had been condemned over and over again, particularly by M. Cuvinot in his report on the estimates. The Commission recommended that, by a revision of the decree of June 13, 1907, the authority of the managers should be strengthened by increasing their power of dispensing rewards and punishments; that before having recourse to private industry for any repairs the certainty ought to be obtained that the dockyards were not in a position to undertake the work; and that in order to ensure the prompt treatment of a number of matters, where the intervention of the central administration too often merely resulted in delaying decision which ought to be taken at once, it should be left to the commanders-in-chief of the squadrons and to the naval prefects to determine and to bear the responsibility.

Contract work. The Commission remarked that the cost of materials supplied for the Navy by contractors had considerably increased, and that the price of turbines seemed in particular to be excessive. They were of opinion that these increased prices might, to a considerable extent, be accounted for by the fact that the naval administration did not offer an adequate resistance to the demands of contractors, and also by the great number of clauses crowded into naval contracts. The Commission proposed to the Chamber to invite the administration to do all it could to get the prices lowered, especially by abolishing certain risks which the contractors were made to assume without any accompanying advantage to the State; to abolish, save in some quite exceptional cases, premiums on contracts, and to require firms merely to turn out what was considered to be necessary and adequate.

Boilers. On the subject of boilers the Commission asked the Chamber to express its regret that for the last ten years successive Ministers of Marine had failed to have recourse to competition in order to obtain the most improved type of boilers at the lowest prices. Instances were given in which, as on August 5, 1905, the Minister gave contracts without competition, and did not secure the best type of boiler. The Chamber was invited to decide that, except where the manifest impracticability of competition has been established and reported to the Parliamentary Committee for the Navy, a competition should be opened between the constructors of boilers which had been approved by the technical advisers of the Ministry. (In relation to this matter the report of a special Boiler Committee has been presented.*)

Ordnance. The Commission had ascertained that the four divisions of battleships and the cruiser division of the Mediterranean Squadron had not the regulation supply of steel shells, that the two divisions of armoured cruisers of the Northern Squadron had only one-third of their proper supply, and that for both squadrons the reserve supplies of steel shell were not complete. As the best type of semi-perforating steel bursting shell was settled three or four years ago, the Commission asked the Chamber to express its very lively regret that during the last three years proper diligence had not been exercised in supplying the squadrons with shell, and in establishing proper reserves. In the case of the six battleships of the Danton class, which were ordered at the end of December, 1906, and ought to be ready at the end of December, 1910, the type of shell to be used was only decided upon at the end of February, 1909, and consequently there was neither the means nor the time to produce the proper supplies for these vessels, and that, in fact, no vote for that purpose was included in the Estimates for 1909. The Chamber was asked by the Commission to censure the want of foresight, and the tardiness of preparation which this state of things revealed.

Works and plant at the ports. Of the programme embodied in the law of March 2, 1901, which was intended to adapt the dockyards to the greater needs of the Fleet, only a small part had been executed; and in view of the total failure to provide docking accommodation for the large battleships of the Danton class, the Commission invited the Chamber to censure the want of foresight and the indifference which these discoveries disclosed. Great works were contemplated, and large sums were placed in the Estimates for them, but little was done, said M. Michel, the reporter; the figures deceived the Chamber. "C'est un manque absolu de sincerité budgetaire."

Central administration. The Commission reported that the various branches of the administration were wanting in unity of views and purpose, in method and in defined responsibility, and that neglect, disorder, and confusion frequently prevailed. The Commission accordingly proposed to the Chamber to demand that the central organisation should be reorganised in a manner which would ensure co-ordination of effort and concentration upon the work of military preparation, and that the head of each department should be allowed, upon his own responsibility, to execute the measures concerted in common under the presidency of the Minister of Marine. In regard to a number of matters which were delayed at headquarters the Commission recommended that the responsibility should devolve upon the commanders-in-chief and the naval prefects.

* See page 29.

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The appointment of the Commission had been provoked by the "Bilan de la Marine," referred to above, and the consideration of the supplementary vote on account of the whole sum was deferred until the report was presented. M. Doumer, who reported on the subject, said that the Chamber could not yet feel assured that money voted would be well spent. "The situation is the same to-day as it was yesterday; the vices of organisation paralyse the good will and the real value of men." Nevertheless it was necessary that the Navy should live and that its vital processes should go on. There was no question of a reorganisation, nor of the proper disposal of naval funds, but the Chambers were asked to vote, not the £1,200,000 of the supplementary estimate, but an immediately necessary sum of £346,000 before the session closed, which was done. This report and that of the Commission were the cause of a somewhat acrimonious debate in the Chamber on July 16th, in the course of which M. Thomson defended his own administration on many points, and explained the apparent paradox of French naval expenditure being greater than that of Germany with inferior development of the Fleet. He showed, and the fact deserves to be noticed in this country also, that the German Navy is new, and has not the burden of large numbers of vessels to maintain effective, nor such great non-effective charges to support. M. Delcassé said that the French Navy was the victim of fashion, caprice, and specious theories. Thus, instead of building battleships, torpedo boats had been multiplied, which were costly and much less useful, and when battleships were built, the administration was hypnotised by the idea of fixing a maximum displacement, and ships of 12,000 tons were laid down, when in England ships of 15,000 tons were being built, and of 18,000 tons when we had exceeded 20,000 tons. The consequence of this debate was the fall of the Ministry by an adverse vote of 176 to 212.

The discussion on the Report. Change of Minister.

The crisis entailed a change of Ministry and brought to the Admiralty, as successor to M. Picard, Vice-Admiral Boué de Lapeyrère, who was at the time naval prefect at Brest, in which position he had displayed qualities that marked him out as an administrator of unusual powers and of fearless and resolute character, who, knowing his own mind, would go straight to the objects he had in view. Born in 1852, he entered the Navy in 1869 and, with forty years' service to his credit, he was at the date of his appointment the youngest vice-admiral on the list. He had seen considerable service in Chinese waters, including the bombardment of Fu-chau, and had shown both coolness and courage in actions with Chinese pirates. He had commanded the Atlantic Division and had held other appointments. He was regarded as a disciplinarian, but was

The new Minister, and the Under-Secretary.

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personally popular, and his departure from Brest was much regretted. Admiral de Lapeyrère's appointment was dated July 24th, and on the same day, on his recommendation, M. Chéron, deputy, was appointed Under-Secretary of State at the Ministry of Marine. This last was an entirely new appointment, and was designed to relieve the Minister of a great deal of routine and other administrative work. To this end the Under-Secretary is charged with the direction of the administrative services and with all matters of administrative, economical and financial order, and in particular with contracts of all kinds. Moreover he supervises the medical and sanitary service, and has charge of matters touching the supply and control of labour, penal legislation, and some other concerns. He has the right of speech before both houses of the Legislature, and it is his duty to assist the Minister in the preparation and discussion of the Budget. M. Chéron, like his chief, has had a difficult task, and in the discussion on the estimates, after six months' experience, he spoke of the Admiral as "not only a chief, but a great chief, upon whom the country could place the highest hopes."

Changes at the Admiralty.

One of the Minister's first acts was to remove the existing Directors at the Ministry, and to replace them by others. New measures demand new men, it was said, and the French Navy was not sorry to witness a beginning of radical change. Vice-Admiral Marin-Darbel succeeded Vice-Admiral Aubert as Chief of the Staff; Rear-Admiral Nény succeeded Rear-Admiral Baudry-Lacantinerie as Director of the Fleet in Commission; Colonel Gosselin succeeded General Gossot as Director of Ordnance; M. Louis succeeded M. Dudebout as Director of Naval Construction; and M. Serres was appointed Controller-General in succession to M. Guimbelot. These and other personal changes preceded all administrative reform. The Minister multiplied himself, to use a French phrase, in visiting the dockyards and other centres, and within a space of time whose brevity astonished many people, he had decided the main lines of his policy, and decree succeeded decree with great rapidity, giving effect to his views.

The new Inspectors-General.

One of the most important of the reforms undertaken by the Minister was the reorganisation of the Superior Council of the Navy, and in association therewith the creation of three additional appointments of Inspectors-General of the Fleet. That of Inspector-General of Submarine Defences already existed (Vice-Admiral Philibert), and the new offices were those of Inspectors-General of the Squadrons in Home waters (Vice-Admiral Caillard), of the Matériel of the Navy (Vice-Admiral Marquis), and of Naval Schools and Depôts (Vice-Admiral Germinet). These officers, under a decree of

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September 5, are Members of the Superior Council, and it is laid down that they shall be the depositaries of the ideas (*de la pensée*) of the Minister, which they are to propagate everywhere, satisfying themselves that his orders and instructions are executed and applied uniformly, and to keep the Minister continually informed of the working of the various branches of the Service, and of modifications that are desirable. There was no purpose of reconstituting the old Committee of Inspectors-General, and the system has been closely modelled upon that which exists in the Army, in which the Inspectors-General are members of the Superior Council of War.

Their functions.

The functions of the Naval Inspectors-General were defined by decree on October 11. The Inspector-General of the Fleet will at least once a year visit the squadrons, chiefly to verify the state of training, and to assure unity of system, especially in manœuvres and tactics. In concert with the naval staff he will prepare schemes for manœuvres and mobilisation, and he will receive all reports concerning the operations and training of the squadrons. The Inspector-General of the Matériel has similar duties in his own sphere, and is in particular responsible for ascertaining the state of the ships in reserve, the sufficiency of the stores and supplies at the dockyards, and the proper reserves, and other matters which concern the mobilisation of the Fleet. The Inspector-General of Submarine Defences is responsible for supervising and reporting upon the operations and training of all the flotillas under his charge. The Inspector-General of Schools and Depôts is to assure himself of the sufficiency and readiness for mobilisation of the services in his province, including men of the Inscription Maritime and recruited men; and under his survey are the discipline and training of men at the depôts, the courses they undergo, and generally the working of all the naval schools.

The Inspectors-General and the Staff.

The relation of these officers to the Chief of the Staff may perhaps best be defined by saying that it is a primary duty of the latter so to direct policy that the ideas of the Minister are executed throughout the Service, and of the former to satisfy the Minister that such is the case. All programmes that fall within their respective provinces to prepare are to be made in concert with the Chief of the General Staff. It has been thought by some that the latter may become somewhat too dependent upon them, but, on the other hand, it is believed by many that the Inspectors-General will form a true Admiralty Council, in close relations with the General Staff, whose position will be strengthened by their presence, as also with the Minister. They meet for discussion at weekly conferences.

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Reorganisation of the Superior Council.

The Reorganisation of the Superior Council of the Navy, which was brought about by a decree of September 29th, had an intimate relation to these changes. The theory that it was necessary to place at the disposal of the Minister on this Council officers actually in command of squadrons has been abandoned. It made the assembly of the Council a matter of difficulty, and it met on rare occasions and at irregular intervals. Under the new organisation, the Council consists of the four Inspectors-General, the Chief of the Staff, and the vice-admirals who have commanded squadrons within the last two years, under the presidency of the Minister. Their duties are concerned with all that relates to the constitution, character, increase, training, and employment of the Fleet—in a word, its organisation and preparation for war. In addition to the members indicated, any other authorities may be called in for consultation. Changes have also been made in the organisation of the Technical Committee, and other committees at the Admiralty.

Reorganisation of the ports and central administration.

Another reform of far-reaching importance is that which reorganises the administrative system at headquarters and at the ports. The authority of the naval prefects is strengthened. They are to co-ordinate and stimulate the work of all the services at the ports, with the object of preparing the forces for war, to see that the vessels are readily mobilisable, and that stores are complete and in good condition to the last detail. The major-generals become in practice sub-prefects, taking an active part in all these affairs. Many other changes are made in purely administrative matters. At the Ministry of Marine the system has been revised on precisely the same lines, so that the working shall be parallel, "au lieu de s'enchevêtrer et de se paralyser." The central administration now comprises the following departments: (1) military; (2) naval construction, ordnance and works; (3) supplies; (4) medical and sanitary; (5) navigation and fisheries; (6) non-effective and other services; (7) administrative control. The department of the Fleet in commission disappears, its duties being distributed. At the ports the prefect calls together the heads of departments once a week for conference and business, and in the same way the Minister presides once a week over a meeting of the heads of all departments, at which the Under-Secretary and the Chief of the Staff are also present.

Reorganisation of the Fleet.

The reorganisation of the Fleet in Commission in Home waters was one of the first cares of the new Minister. He desired to give unity of doctrine and practice to the whole of the forces, and with that object the old distinction between the Mediterranean and Northern Squadrons has been swept away. The last trace of the old

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"Marine du Ponant" and "Marine du Levant" is thus supposed to have disappeared. The two active squadrons are now known as the First and Second Squadrons of the Home Fleet. Each of these squadrons is to consist of six battleships, with two scouts and twelve destroyers attached, the whole being in full commission throughout the year. Two other squadrons, similarly constituted, will have nucleus crews, and there will be a certain reserve. This is the ultimate organisation, and is not yet complete, but the immediate purpose of the Minister was to unify the two squadrons and to strengthen them as new ships became available. For a time each will have a division of armoured cruisers attached. Generally the squadrons will look to the bases to which they have hitherto resorted, but there will be no rule in this, and it is intended that they shall exercise as often as possible together, sometimes in the Mediterranean, and sometimes in the Ocean or the Channel. Bizerta, however, will become a more important base, and ultimately there will be two squadrons in the Mediterranean. Admiral de Lapeyrère is also strongly opposed to leaving isolated vessels on small stations, and proposes to have a squadron of three armoured and one other cruiser in the China Seas and the Pacific. On the other hand, the divisions in Algeria and Corsica are suppressed.

Regrouping of the training establishments.

Closely connected with these changes is the grouping of the gunnery training ships in a single organisation under a flag officer, Rear-Admiral Le Bris, which is admitted to be a great improvement on the old system, and a like arrangement has been made in the case of the torpedo schools. The whole system of training is likely to be reorganised in relation to these changes. In addition, the reorganisation of the naval school, the Borda at Brest, has been under consideration. It has been decided that a school shall be built on shore, and in 1912 the French Navy may have a cadet school much on the lines of Dartmouth, Leghorn, or Annapolis. This development has long been planned.

Budget reorganisation.

Another important change, of a financial order, is the rearrangement of the budget on better and more definite lines. There will henceforth be a rigid distinction between the affairs of the Navy and those of the mercantile marine, which latter come within the purview of the French Minister of Marine, and between both these and the expenditure on new construction, works at the ports or elsewhere, ordnance, etc. These latter were the special matters alluded to in M. Picard's "Bilan de la Marine," alluded to above.

Budget of 1910.

The Budget of 1910, as approved by the Budget Committee, amounted to £14,857,000, being only £2000 less than was demanded by the Government, although the total amounted to nearly

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£1,520,000 more than that of 1909. Thus complete approval was expressed of nearly every reform made by the new Minister. The chief additions, in round figures, are as follows: for additional men, £60,000; for officers and technical and administrative *personnel*, £40,000; victualling stores, £60,000; other stores, £120,000; naval construction, £320,000; ordnance, £720,000; works at the ports, £40,000.

M. Michel's Report.

M. Michel, who reported to the Budget, was more modest than some of his predecessors, who have generally endeavoured in voluminous documents to show what they have considered to be the whole duty of successive Ministers of Marine. There has, indeed, as he says, been much that called for criticism in the past, and a remedy was required for many evils, which the new Minister and the Under-Secretary very evidently resolved to apply.

"L'heure de la critique est passée; des temps nouveaux commencent pour la Marine; faisons confiance et crédit a ceux qui ont charge de la rénover . . . Nous devons rendre hommage aux excellentes intentions dont le sous-secrétaire d'Etat nous paraît animé. En un laps de temps relativement court, s'il est comparé aux lenteurs inhérentes au fonctionnement habituel de tout organisme administratif, M. Chéron a tenté de réaliser les premiers et possibles réformes. Il en fait étudier d'autres importantes, dont il promet l'application à bref délai."

M. Michel thought that the Minister had not gone far enough in "scrapping" old vessels (see pp. 28–9), and he considered the new Inspector-General of the Matériel of the Navy unnecessary, on the ground that he would duplicate the functions of certain other officers who have inspecting duties. He described the programme attached to the Budget as a "document sincère," because 21 submarines and submersibles, which had been voted in 1907, 1908, and 1909, but had never been laid down, had disappeared as if by enchantment. At the same time, he observed, by not building such vessels, France was losing her lead, and in the debate on the Estimates he expressed very strong views on the subject.

Budget Programme, 1910.

The actual Budget Programme of 1910 included no big ships to be begun. It provides only for the laying down of six destroyers (750 tons, 31 knots) like those begun last year, three of them to be built in the dockyards and three in private yards; two destroyers—M 84 and 85—(450 tons, 28 knots) to be built at Rochefort, and two torpedo-boats (181 tons, 26 knots) to be built in private yards. Two submarines nominally included in the programme really belonged to the year 1909.

The Organic Law for the construction and commissioning of ships.

It was announced, with regard to the building of large vessels, that the programme would be presented in the form of an organic law when the plans had been investigated, which law has since been prepared. The idea is not new in France, where the effects of the German Navy Law have been watched with admiration and envy. In 1896, and again in 1907, the Chamber, on the motion of Admiral

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Bienaimé, passed resolutions inviting the Government to bring forward such an organic law. The plan was developed in the memorandum accompanying the "Bilan de la Marine" of M. Picard, who said that a definite policy would put an end to ceaseless debate. "Allant vers un but précis, le Gouvernement et le personnel de la Marine, n'ayant plus à chercher leur voie, pourront marcher d'un pas ferme et assuré." It was proposed to establish a programme of construction showing the number and classes of vessels to constitute the Fleet, as well as their age limit, and the system on which they would be replaced, their grouping, their manning, their supplies, their bases, and some other matters.

Strength estimated to be required.

The Superior Council of the Navy had several times laid down the proper strength which it considered should be attained, these recommendations varying from time to time; but a revision, which was arrived at in May, 1909, when the present Minister of Marine was a member of the Council, proposed an establishment of 45 battleships, 12 scouts, 60 fleet destroyers, and 24 smaller boats for coast defence, besides 64 submarines, and certain mine layers and sweepers, floating workshops, etc. This programme would have involved enormous expense, but it was formulated after full consideration of the effect of the German Navy Law, and there was some curiosity to see how Admiral Lapeyrère would approach the problem with the weight of ministerial responsibility upon his shoulders.

Features of the law.

In the organic law, as approved by the Council of Ministers on his recommendation, on February 7, 1910, he appears to have adopted the general lines of earlier proposals of the Superior Council (1896 and 1898), so far as battleships are concerned. The basis of the new law was not, however, arrived at until after the Minister of Finance had communicated his views to the Minister of Marine, nor until the situation had been considered at a conference at the Elysées, at which the President of the Republic presided, and at which the President of the Council and the Minister of War were present. The text of the preamble and some details of the law will be found in Part IV. The effect is to prescribe the creation and organisation of a fleet of 28 battleships, forming 4 squadrons of 6 ships each, with 4 as a reserve; 10 scouts, being 2 for each squadron and 2 as a reserve; 52 sea-going destroyers, to constitute a flotilla of 12 for each squadron, and 4 to be as a reserve. For foreign service there are to be 10 vessels, with such despatch-boats and gunboats as may be required. The coast-defence destroyers will number 45, and the submarine defence will consist of 94 boats; there will also be 4 mining and certain other special vessels. Battleships and vessels for foreign service will be replaced after 25 years of existence if laid down before

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1909, and after 20 years if laid down later; scouts after 20 years; destroyers and submarines after 17 years; other classes of vessels as they become unfit for service. Under the German Navy Law the periods are reckoned from the first grant for the laying down of a vessel to the same period in the case of her successor. The French plan is to date the "life" from the order to lay down a ship, or the date of the signing of the contract, to the date of the *completion* of her successor. Thus, as compared with the German system, the life, or *Lebensdauer* as the Germans call it, of the French ships may be considered as abridged by as much as two years. A special rule applies to the replacing of ships which may be lost. In regard to commissioning of ships, it is provided that two battle squadrons shall always be in full commission, while the other two have nucleus crews, their specialist ratings never being reduced below a proportion of two-fifths. Like rules apply to the scouts and to the four destroyer flotillas, of which latter two will have full complements and two nucleus crews. Vessels on foreign stations will always have full complements; the same will be the case with submarines, while half the coast-defence torpedo-boats will have nucleus crews. The plan prescribes also for the establishment of complements for vessels, the maintenance of the necessary numbers, with an excess of 5 per cent. of the total number, the maintenance of stores for the vessels and the improvement of the ports.

Consequences of the law.

In relation to this programme an obvious consideration presents itself. It is that the French Minister of Marine, and with him the Superior Council, appears to have definitely renounced any attempt at an approach to equality with Germany. "Ce n'est pas sans tristesse," said the *Yacht*, "que nous voyons un projet de loi enregistrer officiellement notre déchéance et admettre que la marine française ne sera plus comptée au nombre des grandes marines." "Le nouveau projet," remarked the *Moniteur de la Flotte*, "consacre notre renoncement à une égalité, même aprochée, avec la marine allemande." It must, however, be observed that Admiral Lapeyrère described the programme as a "minimum," and that he says the Organic Law will be "elastic," like the German Navy Law. It is proposed that the prescribed establishment shall be reached by January 1st, 1919, at which time, of battleships now existing and in hand, only the Suffren, the six Patries, and the six Dantons will remain. Sixteen battleships are to be laid down, up to and including the year 1919, six of them additional, and ten to replace the Brennus (1910), Charles Martel and Carnot (1912), Jauréguiberry (1913), Bouvet and Masséna (1914), Charlemagne and St. Louis (1915), Gaulois (1917), and Suffren (1919). Two battleships additional and

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for replacement will be laid down each year, 1911–16, one in 1917, and one in 1919.*

Strategic objects.

Admiral Boué de Lapeyrère says that the first object is to create a battle fleet capable of energetic action in emergencies. Elsewhere, he says that a coast-defence force is to be organised as "the condition of offensive action." By this it is understood that he looks chiefly to the employment of the battle fleet in the Mediterranean, and this view was confirmed in the debate on the Estimates, when he said that on the proper provisioning and victualling of Bizerta there would be two squadrons in that sea. "Concentration of vessels must not be confounded with their accumulation in a naval port." The coast-defence force will consist of a smaller class of destroyers, the submarines, and mining and other vessels, and, presumably, will be chiefly stationed in the narrow waters of the Straits of Dover and the Channel, to make these waters impassable, if possible, to a hostile fleet approaching from the North Sea. And here doubtless the Admiral anticipates that France will find a naval ally. Thus the battle fleet would secure the strategic freedom referred to. Such arrangements are obviously necessary in the case of France, with her two sea-boards separated by the Iberian peninsula, and at the same time a fleet relatively weak.

Characteristics of the proposed ships.

With regard to the characteristics of the new battleships, of which two have been provided for in 1910, they have been arrived at after full consideration of the experience gained in the Iéna firing trials, in which that vessel was the target. (An account of these trials will be found in the Ordnance section of this volume.) The ships will displace 23,082 tons, and the Admiralty constructors and those at the private yards were desired to prepare plans. The armament intended is twelve 12-in. 50-calibre guns in six turrets, of which two will be forward, one firing over the other, and two abaft similarly placed, while the other two turrets will be located severally on either broadside. The gun is of a new pattern, firing a 970 lb. melinite shell. The arrangement would give a broadside fire of ten guns, and ahead and astern fire of eight guns. It has been criticised, but the *Moniteur de la Flotte* says it is sufficient and satisfactory, and that it will make the new French ships superior to 16 British, 6 German, 4 Japanese, and 6 American Dreadnoughts; equal to 6 German, 3 Japanese, 2 American, 4 Russian, 2 Italian, and 3 Brazilian Dreadnoughts; and inferior only to the

* M. Chaumet, reporter of the Navy Committee of the Chamber, recommending the adoption of the programme, estimates the consequent expansion of expenditure as follows: 1910, £14,857,000; 1911, £16,670,000; 1912, £17,150,000; 1913, £17,554,000; 1914, £18,120,000; 1915, £17,960,000; 1916, £18,400,000; 1917, £18,180,000; 1918, £17,979,000; 1919, £16,747,000.

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British ships which may carry 13·5-in. guns. The French ordnance department, moreover, is to study the characteristics of a gun of the latter calibre, and it is possible that ships to be built later may have a heavier armament. The proposed smaller armament of the new ships consists of twenty-two 5·5-in. guns, eighteen of them (nine on each side) in groups of three in lateral casemates, protected by 7-in. armour, and the other four located in pairs on either side further aft. These guns will fire 80 lb. shell at the rate of eight rounds per minute. The freeboard will be 23 ft. at the bow and 16 ft. 6 in. at the stern. The most elevated of the big guns will be 37 ft. 8 in. above the water-line, and the lowest 21 ft. 6 in. The water-line protection will be an end-to-end belt 10·6 in. thick over the vital parts, reducing to 7 in. at the ends, and rising 7 ft. 8 in. above the water-line and descending 8 ft. below. Below this belt will be another range of the same thickness, extending half the length of the ship and protecting the engines, boilers, and the principal dynamos and auxiliary machines, and there will be thick bulkheads in connection with the protection of the bases of the turrets. The casemate protection of the 5·5-in. guns will protect also the bases of the funnels, and there will be two armoured decks. The internal protection of the Danton class from torpedo attack will not be reproduced, but there will be a considerable subdivision of the hull. Admiral de Lapeyrère estimates that some £2,000,000 has been wasted on this doubtful protection of the Dantons. The torpedo armament of the new ships will consist of four 18-in. tubes. The ships will have turbine engines driving four screws, intended for a speed of 20–21 knots. The range at 10 knots, with full bunkers, will be 8400 miles, and at full speed 2300 miles, with 28,000 I.H.P. The complement will comprise 930 officers and men. The cost of the ships is estimated at £2,680,000 each.

Battle-ships.

Five battleships of the Danton class were launched in 1909—the Voltaire on January 16 at La Seyne, the Diderot on April 20 at St. Nazaire (Loire), the Condorcet on April 21 at St. Nazaire (Penhöet), the Danton on July 4 (after an unsuccessful attempt to get her afloat on May 22) at Brest, and the Mirabeau on September 28 at Lorient. All these ships are intended to be completed in 1910, as well as the Vergniaud, which is building at Bordeaux. Possibly one or two of them will be delayed until the beginning of 1911. The Diderot and Condorcet are to proceed to Brest for completion. The Danton class has been fully described in the *Naval Annual*.

Armoured cruisers, and scouts.

The armoured cruiser Ernest Renan has been completed, and the Edgard Quinet is to be completed at Brest in 1910. The Waldeck-Rousseau has been somewhat delayed at Lorient, and cannot be

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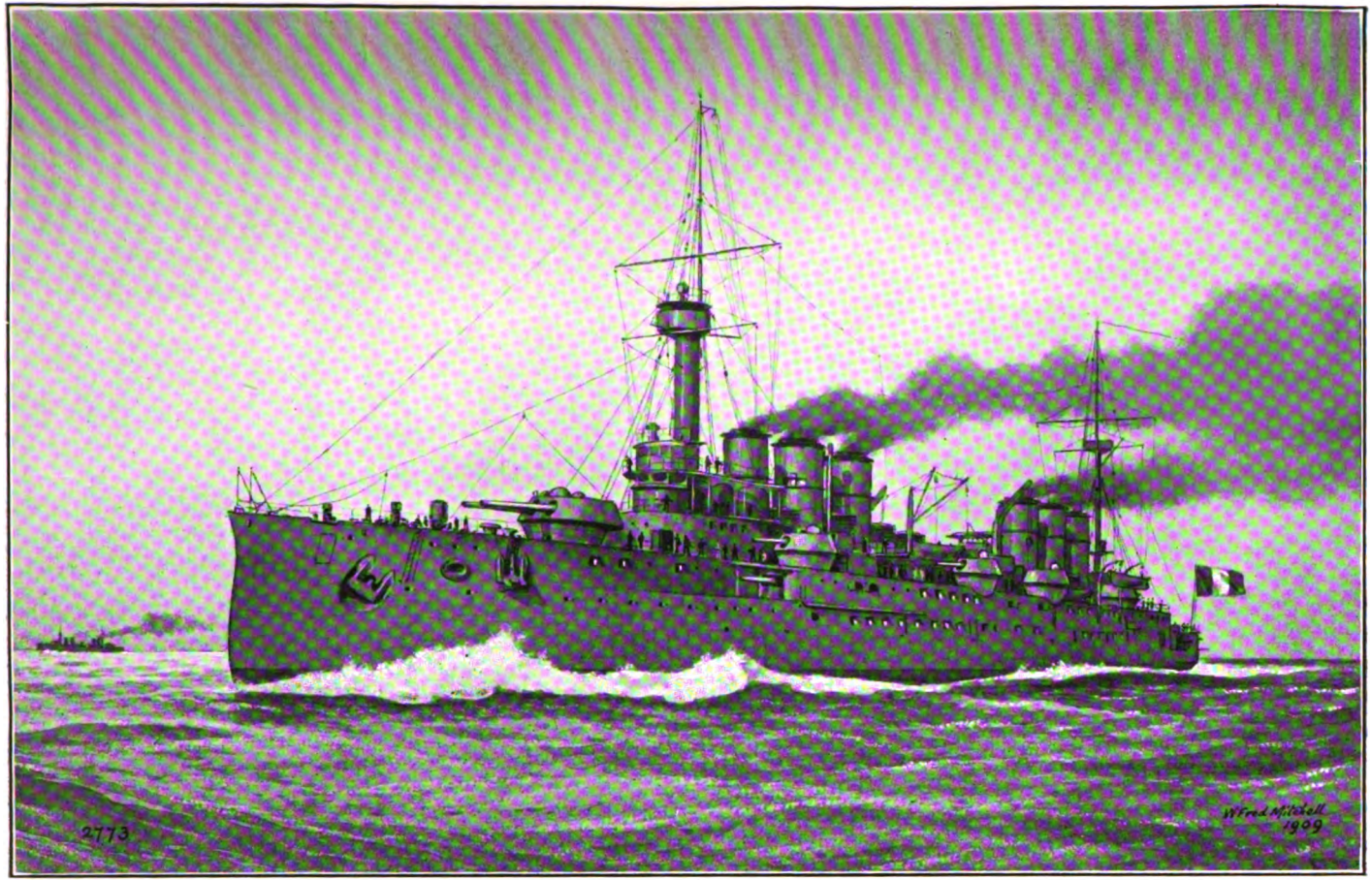

FRENCH ARMOURED CRUISER "ERNEST RENAN."

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completed until 1911. In the Ernest Renan a great deal has been sacrificed to speed. The following are particulars of her trials not given last year:—

Date.	Duration.	H.P.	Speed.
February 25, 1909	24 hours	23,500	21·4
March 13, 1909	10 „	37,100	25·0
June, 1909	3 „	37,500	25·5

In every case the coal consumption was described as having been remarkably low. No armoured cruisers being included in the Organic Law, it is presumed that no other vessels of the class will be constructed. Those which exist will be employed on foreign stations or on scouting service with the fleet. The scouts to be built under the Organic Law will begin to be laid down in 1917, and six will be begun in or before 1919. They will replace the Marseillaise, Jurien de la Gravière, Jules Ferry, Amiral Aube, Victor Hugo, and Léon Gambetta.

Destroyers.

Nine destroyers were completed in 1909—the Massue, Carabinier, Hussard, Tirailleur, Glaive, Poignard, Voltigeur, Chasseur and Mameluck. These are of the 450–330 ton class. The Voltigeur steamed at 31·65 knots on her six-hours' trial, and the Chasseur (Parsons turbines) at 30·4 knots. Eleven others are in hand, of which the Janissaire, Cimeterre, Fourche, Boutefeu, and Casque are to be completed in 1910. With the exception of the first-named, these are of the fleet destroyer class. The six fleet destroyers of 750 tons to be laid down in 1910, as well as five of 1909 (Bory, Garnier, Rivière, Mehl, and Dehorter), are to be driven by turbines—Parsons, Breguet, Rateau, and Zoelly. The horse-power will be from 13,000 to 14,000, the speed 31 knots, and the range of action 1170 miles at 14 knots. The boats will have four tubes and be armed with two 3·9-in. guns and four 9-prs.; complement, 4 officers and 58 men. These boats will complete 18 of the class. The smaller destroyers Enseigne Henry and Aspirant Herbert (M 84 and M 85) will also be turbine boats, displacing 450 tons, and engines of 8600 horse-power are to give a speed of 28 knots. The boats will have two tubes and six 9-pr. guns. The same complement is indicated in the Budget annex as for the bigger vessels. The two torpedo boats, 181 tons, will have a speed of 26 knots, with engines of 4200 horse-power; three tubes and two 3-pr. guns; complement, 2 officers and 23 men. Under the Organic Law, eight additional destroyers are to be built, and twelve to replace obsolescent boats (1910–19). The establishment to be reached is fifty-two sea-going and forty-five coast-defence destroyers, but the latter do not appear in the programme of construction.

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Sub-marines.

Eight submarines were launched in 1909, all since completed; 12 are to be completed in 1910, and 14 to be carried forward, while two, which should have been laid down last year, will be put in hand. All others have been struck out of the programme attached to the Budget.

In comparative trials of submarines and submersibles, which took place in the Channel in June—the most realistic and instructive the French have ever undertaken—the submersibles of the Pluviôse type showed themselves excellent from all points of view, and the superiority of the submersible over the submarine was placed beyond doubt.

Successful trials were carried out at Cherbourg during the autumn with the Archimède, which is the first of three sea-going submersibles put on the stocks three years ago. She has been designed by M. Hutter, while the other boats, the Mariotte and the Amiral Bourgeois, are respectively from the designs of M. Radiguet and M. Bourdelle. The boats last-named have Diesel engines for surface navigation, but the Archimède is fitted with Du Temple boilers. In designing this type of submersibles the object was to secure sufficient range of action to allow of boats navigating the North Sea and at the same time to provide good accommodation for the crew on long voyages. The Archimède has a displacement of 577 tons at the surface and 810 tons with water ballast for submersion, and her range of action on the surface is 2500 miles. She was designed to attain a speed of 15 knots on the surface and 10 knots submerged, and during the trials the speed reached was 15½ knots. The battery of accumulators will allow of the boat navigating for 30 hours under water at 10 knots, after which it is, of course, recharged on the surface. There is a crew of 24 men and three officers, while the accommodation for the men is much more commodious than in other submersibles. The Mariotte, the smallest of the three boats, displaces 530 tons on the surface and 625 tons submerged. The Charles Brun has machinery of a new type—"accumulator boilers"—which are to enable her to proceed under steam submerged. Under the Organic Law (1910–19) nineteen additional submersibles are to be built, as well as thirty-one to replace boats becoming obsolete, beginning with the Français, Algérien, Follet, Castor, Loutre, and Souffleur in 1912.

Vessels condemned.

During 1909 the following vessels were struck off the list: battleships Courbet, Dévastation, Formidable, Magenta, and Amiral Baudin; despatch boats Léger and Bombe; Epervier, destroyer; 19 torpedo-boats; submarines Narval, Y, and Gustave Zédé; river gunboats Comète, Estoc and Henry Rivière. The Redoutable, Hoche,

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Caïman, Indomptable, Jemmapes, Valmy, Cocyte, Fusée and Mitraille are condemned or to be condemned; the Requin becomes a tender to the gunnery school at Toulon; the Furieux will probably be used as a target for torpedo practice. A great many of the old protected cruisers are on the list for "scrapping."

Fleet operations.

Two other subjects deserve mention. In July and August there were manœuvres, the Mediterranean and Northern Squadrons being combined under command of Vice-Admiral Jauréguiberry; but so many vessels were detached and in dockyard hands that the command included only five battleships and four cruisers, and the operations were therefore confined to ordinary exercises, which, however, revealed the disparity that exists in the signalling systems or methods employed in the two squadrons. The reorganisation of the Fleet should put an end to this state of affairs.

The Tactical Committees.

The Tactical Committee, which has been investigating and formulating the system of tactics to be employed by the French Fleet based upon the work of Admiral Gervais and his successors, is to push forward its work so that it may be completed early in 1910, and be issued to the Fleet, in order that the systems may be practised in the grand manœuvres, which are to be directed by Vice-Admiral Caillard. That officer is a member of the Committee, as are Vice-Admiral Germinet and Rear-Admirals Le Pord and De Montferrand.

Boiler Committee.

A strong Boiler Committee, composed of naval constructors, engineers, and naval officers, under the presidency of Vice-Admiral Kiésel, reported to the Minister on August 14th. Its conclusion was in the following words: "Les divers types de chaudières susceptibles d'être adoptés sont les types Belleville et Niclausse." Thus the Babcock and Wilcox seems not to have been approved, and small-tube and vertical-tube boilers were rejected. The committee also recommended an increase of grate-area.

GERMANY.

A chapter on the German Navy appears elsewhere in this volume, and therefore in what follows here little more than a statement will be given of the progress and events since the issue of the last volume of the *Naval Annual*. The *Marine Rundschau*, in reviewing the year 1909, pointed out its importance as the tenth since the passing of the Navy Law, and since Count Bülow said in the Reichstag that, in the coming century, Germany would be either the hammer or the anvil, adding that the German people would no longer be the vassals (*Knechte*) of humanity. The following table, in continuation of that

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given last year, indicates the vessels yet to be built under the Navy Law, beginning with those voted for 1910. It may be remarked that each division of destroyers consists of twelve boats :—

Navy Law programme.

	Battleships.	Armoured Cruisers.	Small Cruisers.	Division of Destroyers.
1910	3	1A	2	2
1911	2 + 1 A	1A	2	2
1912	1	1	2	2
1913	1	1	2	2
1914	1	1	2	2
1915	1	1	2	2
1916	1	1	2	2
1917	1	1	1 + 1 A	2
	12	8	16	16

A = additional ships.

Programme of 1909.

The following vessels were provided for in 1909, and are building at the yards named. Battleships: Ersatz Frithjof (Schichau, Danzig), Ersatz Hildebrand (Imperial Yard, Kiel), Ersatz Heimdall (Vulcan Yard, Hamburg). Cruiser-battleship "H" (Blohm and Voss, Hamburg). Protected cruisers Ersatz Bussard (Weser Yard, Bremen), Ersatz Falke (Vulcan Yard, Stettin). Destroyers 174, 175 (Germania Yard, Kiel), 176–179 (Schichau, Elbing), 180–185 (Vulcan Yard, Stettin). With regard to the battleships Ersatz Hildebrand and Ersatz Heimdall, the *Rundschau* said that the decision to adopt turbine propulsion was arrived at only in October, and that they could not be begun until November, and added that English statements as to these vessels being accelerated were therefore exaggerations. The *Rundschau* did not, of course, imply that preparations for the ships had not been begun or that materials had not been collected or ordered. The vessel which has been referred to as specially accelerated is the Ersatz Frithjof, which was officially laid down on April 8, though materials had previously been collected. She is expected to be completed in the summer or autumn of 1911.

Launches and progress of construction.

The following vessels were launched in the year under review: the battleships Helgoland (Howaldt Yard, Kiel, September 25), Ostfriesland (Wilhelmshaven, September 30), and Thüringen (Weser Yard, Bremen, November 27); the protected cruisers Köln (Germania, Kiel, June 6), and Augsburg (Imperial Yard, Kiel, July 10); the river gunboat Otter and fourteen destroyers. The ships completed are the battleships Nassau, Westfalen, and Rheinland,* the armoured

* Not yet officially completed.—Ed.

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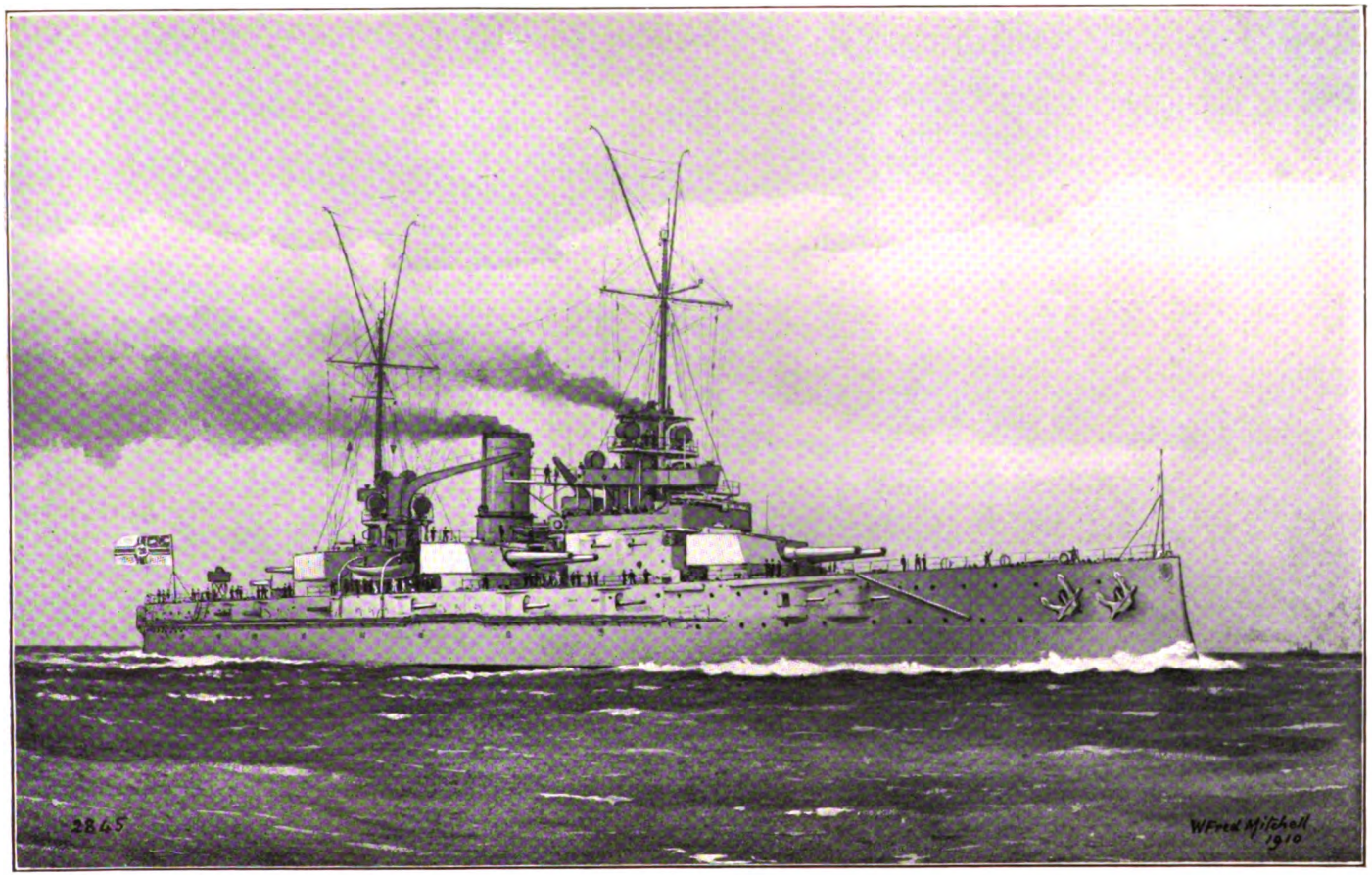

GERMAN BATTLESHIP "NASSAU."

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cruiser Blücher (which have joined, or will shortly join, the High Sea Fleet), and the protected cruisers Emden and Mainz, as well as the 1908 destroyers. The battleship Posen and the protected cruiser Köln have been undergoing trials at Kiel. The Nassau, Westfalen, Rheinland, Posen, Blücher, and Von der Tann were officially to join the Fleet in 1910; the Ostfriesland, Helgoland, and Thüringen are to join in 1911; and the Ersatz Frithjof, Ersatz Hildebrand, and Ersatz Heimdall in 1912. Lloyd's "Annual Summary of Shipbuilding," 1909, states that in that year the total tonnage of German warships launched, being vessels of more than 100 tons displacement, was 99,116, as compared with 97,660 tons in 1908. These years were much in excess of any previous years.

Nassau class.

All the German battleships recently completed are armed with 11-in. guns, and it appears not to be quite certain that all those launched in 1909 have guns of larger calibre. The vessels laid down in that year, however, have the 12-in., and of these the Ersatz Hildebrand and Ersatz Heimdall are the first German battleships to have turbine engines. In the Nassau class (Nassau, Westfalen, Rheinland, and Posen), the twelve 11-in. guns are mounted in six turrets, all on the same level, two of them on the keel-line severally forward and abaft, and two on either side, the corresponding port and starboard turrets being abreast of one another. The result is that the Nassau and her sisters have for direct ahead and astern fire six guns, and for broadside fire eight guns. Thus, though carrying two big guns more, they can bring no greater number to bear than the Dreadnought, except in case they should be attacked on both sides. It is contended, however, by the Germans that the 11-in. gun is in power equal to our 12-in., and in endurance superior, but this is not credited in this country. The heavy guns of the Nassau are of 45 calibres, but the new model German 11-in. gun is believed to be of 50 calibres. An advantage is claimed for the Nassau's twelve 5·9-in. guns, mounted six a-side behind armour in a citadel, and her sixteen 3·4-in. grouped in casemates, but the "all-big-gun" principle is violated, the value of the medium gun is doubtful, and the anti-torpedo guns are not equal to those of any of our later ships except the Dreadnought herself. The Nassau and her sisters displace 18,200 tons, their machinery consists of three triple-expansion reciprocating engines, and their nominal speed is 20 knots, though the Posen is expected to have half a knot more. No definite particulars have been published concerning their protection. The dimensions are: Length, 455 ft.; beam, 88 ft. 6 in.; draught, 26 ft. 6 in. The normal coal capacity is 950 tons, and the maximum 2700 tons. The full complement is 931 officers and men.

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Trials. The Nassau is reported to have made a speed of 20 knots on the measured mile in October, after which her propellers were changed preparatory to further trials. A later report gave her speed as 20·7 knots, being a little more than was anticipated. She underwent her gun-trials in February, all guns being tested, and broadsides being fired from the big guns with full charges. All went off satisfactorily. It has been stated that she is deeper in the water than was intended. The Westfalen developed a speed of 20 knots with 24,000 horse-power in her preliminary trials in December, and in January steamed at 20·25 knots with 26,792 I.H.P. The *Marine Rundschau*, in its survey of the year, said the trials of these vessels and the armoured cruiser Blücher, so far as they had proceeded, were very satisfactory to the builders.

Helgoland class. No definite particulars are available concerning the Helgoland and her sisters. According to statements made in Germany they will displace about 22,000 tons, with 490 ft. length, nearly 90 ft. beam, and 27 ft. 6 in. draught. The armament assigned to these ships is twelve 50-calibre 12-in. guns, fourteen 5·9-in., and twenty 4·1-in. The designed speed has been given as 20 knots.

Blücher. Particulars of the armoured cruiser Blücher were first made public by "Nauticus," who also gave a diagram and description of the ship, remarking that she was not the equal either in power or speed of the contemporary Indomitables. She was built in the belief that the Indomitable displaced only 15,000 tons, and when the facts became known it was too late to alter the Blücher. This is now fully admitted in Germany and has been the subject of much comment. Count Reventlow says Germany was deceived and must lead instead of endeavouring to follow. The Blücher carries twelve 8·2-in. 45-calibre guns, arranged on the plan of the 11-in. guns of the Nassau, eight 5·9-in. in a central casemate, and sixteen 3·4-in. She displaces 15,253 tons, and is 499 ft. long with 80 ft. 3 in. beam. "Nauticus" said her speed was "over 24 knots," with 32,000 I.H.P., and her normal coal capacity 900 tons, with a maximum of 2300 tons. In point of fact, while on her trials at Danzig, the cruiser attained a speed of 25·3 knots, her three triple-expansion engines developing about 40,000 I.H.P. Her complement is 847 officers and men.

German Indomitables. Of the successors of the Blücher, being German Indomitables or Dreadnought-cruisers, little is known. The Von der Tann, launched in March, 1909, is to be completed in the spring of 1910. The following description has been given:—Displacement, 19,000 tons, length 560 ft., beam 85 ft., draught 27 ft.; armament, twelve 11-in. guns in six turrets (four on the middle line and two *en échelon*), twelve 5·9-in. guns in a citadel, and sixteen 3·4-in.; five torpedo

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tubes; 44,000 I.H.P.; speed over 25 knots. She belongs to the programme of 1907, and the G and H (1908 and 1909), which are also building at the yard of Messrs. Blohm and Voss, are, like the Von der Tann, to have Parsons turbines. G was launched in April, 1910, and named Moltke; another of the class, J, will be begun in 1910.

Protected cruisers.

The protected cruiser Mainz, launched in January, 1909, at the Vulcan yard, made, during her trials in the Pomeranian Bay, a speed of 27·5 knots, being half a knot more than the contract, and later, in September, she beat the German record by attaining a rate of 28 knots. She is fitted with turbines of the "A.E.G." (Allgemeine Electricitäts-Gesellschaft) type, developing about 20,000 I.H.P. Subsequently to her trials the turbines called for repairs at Stettin. She and her sister, the Kolberg, displace 4232 tons, while the Köln and Augsburg, built respectively at the Germania yard and the Imperial yard, Kiel, are a little larger—4261 tons. The Köln has completed her trials. She has "Germania" (Zoelly) turbines. She is 401 feet 8 in. long, 46 feet beam, 16 feet 6 in. draught, and she carries twelve 4·1-in., four 2·2-in. and four machine guns, having also four submerged torpedo tubes. The contract speed is 27 knots with 20,000 I.H.P. The Emden is said to have attained 25 knots on her trials, while the Dresden, which has Parsons turbines, averaged 27·5 knots, and the latter crossed the Atlantic in September to take part in the Hudson-Fulton celebrations. The two protected cruisers of 1909, Ersatz Bussard and Ersatz Falke, are in hand respectively at the Weser Yard, Bremen, and the Vulcan Yard, Stettin. Two others, Ersatz Condor and Ersatz Cormoran, are to be begun in 1910.

De-stroyers.

The destroyers voted in 1908 were completed and began trials in 1909. They are numbered 162 to 173, and displace 615 tons. Their speed is from 30 to over 36 knots. The following are some trial speeds:—V 164 (A.E.G. turbines), 34·45 knots; S 166 (Schichau turbines), 36·30 knots (average on all runs, 35·93 knots, mean speed in later trials 34·6 knots; G 171 (Parsons turbines), 34·72 knots; G 173 (Zoelly turbines), 33·3 knots. G 169 made a successful rough-weather trial in the North Sea in December. A flotilla of 11 of these turbine destroyers was in commission in January.

The destroyers of the 1909 programme (Nos. 174–185) are also turbine boats, and are rapidly approaching completion. One of them was announced as having been completed in December, 1909, at the Vulcan Yard, Stettin, which was regarded as an achievement in rapid construction. This boat appears to be V 180, which was launched October 15. V 181, 182, and 183 were launched respectively on November 6, December 1 and 23, and G 174 on January 8.

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Sub-marines.

Eight submarine boats are completed, U 1–U 8, and several are in hand at Danzig. U 3 and U 4 made on November 9 and 10 the passage from Cuxhaven round the Skaw to Kiel, a distance of 540 miles, in a little over 40 hours, without convoy, the speed being about 12 knots. Officers and men suffered nothing during the cruise, and the boats proved quite satisfactory. These boats were built at Danzig, and had previously been under trial in the Baltic. Four of the boats have been constructed at Danzig and four at the Germania Yard, Kiel.

The dock-yards and cost of construc-tion.

The Kiel dockyard scandal ended in the acquittal of the persons charged with fraud in the matter of the sale and purchase of old stores. There was a common opinion that the prosecution was a mistake. Its effect was to disclose an unsatisfactory situation existing in the dockyards and a want of businesslike methods, and to afford a malicious joy to the Socialists. Admiral von Tirpitz admitted in the Reichstag that the control had been inadequate, and he promised to introduce a more stringent system. The truth is that the immense development of the German Navy has outstripped the old system of organisation and administration, and placed in the hands of high officials a vast amount of detailed work which they could neither understand nor supervise. The condition was perhaps inevitable, but it will certainly be changed. Admiral von Tirpitz strongly defended the dockyards as well-administered institutions. Their efficiency was proved, he said, by the fact that the Fleet, exercised in the autumn of 1909, consisted of over 100 vessels, and that there was no breakdown or serious trouble. As to their economical working, he gave the following figures of the cost per ton of various vessels:—Battleships: Kaiser Friedrich III. (1898), £45; Wittelsbach (1902), £44; Schwaben (1903), £43; Hannover (1907), £37; Nassau about the same as the Hannover. Armoured cruisers: Prince Heinrich (1902), £57; Prinz Adalbert (1903), £52; Roon (1905), £44; Blücher (1909), £43. These figures obviously do not include armaments. In the discussion of the Navy Estimates the Admiral denied that the State yards worked more expensively than private yards, and said that the latter now had 76 per cent. of new construction as compared with 40 per cent. formerly, and that the percentage would be increased as far as possible.

In relation to this matter, the following comment of the *Kölnische-Zeitung*, in an article on the subject of naval economies, is noteworthy:—

It will be necessary very seriously to examine the question whether, especially as regards the navy, restriction of State industry in favour of private industry is not possible. For a number of reasons State factories and yards can never be dispensed with altogether. One reason is that they are necessary for the enlistment of a

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personnel technically trained. But it has repeatedly been proved that State establishments work less economically, and to some extent more slowly, than private establishments. In view of the powerful development of private industry in Germany, it can no longer seriously be maintained that State industry is necessary for the reason that private industry would fail us in time of need. It is certainly less likely to fail us if by being given large orders for war material in peace time it is enabled duly to equip itself for carrying out such orders. So far as we are aware, neither the army nor the navy authorities have had any reason to complain of the supplies of private firms; they have often, on the contrary, expressed glowing praise of them. There would seem, then, to be no practical objection to more extended employment of private industry. It must be added that if the War Departments give an increasing number of orders to private firms it is probable that the number of firms which produce war material would increase, and that in consequence competition would lead to an adjustment of prices to the advantage of the finances of the State.

Naval expenditure.

The Navy Estimates for 1910 amount to £21,704,411, as compared with £21,980,000 anticipated. The increases are remarkable, and affect practically every vote and service. The total increase, as compared with last year, is not less than £2,109,442. The vote for submarines is increased from £500,000 to £750,000.

Italy.

By the Navy Law of June 27, 1909, it was provided that the effective votes for the naval Service should be augmented by supplementary credits for the expansion of the Fleet, beginning in the year 1909–10 with £2,094,400, increasing in 1910–11 to £2,400,000, in 1911–12 and the following year to £2,800,000 per annum, and concluding in the three years 1913–14 to 1915–16 with £3,200,000 per annum. Including the supplementary credit, the Estimates for 1910–11, as presented to the Chamber on November 30, 1909, amounted to nearly £7,000,000, being an increase of about £166,000 as compared with the previous year. The programme includes the four battleships Dante Alighieri, Conte di Cavour, Giulio Cesare, and Leonardo da Vinci, the three scouts Quarto, Marsala, and Nino Bixio, twelve destroyers, fifty torpedo-boats, and some submarine boats. Admiral Mirabello, then Minister of Marine, spoke with a good deal of optimism as to the probable completion of the battleships before the close of 1912; but in view of the previous history of shipbuilding in Italy, and of the fact that berths would have to be lengthened for the building of Dreadnoughts at every place save the Castellammare and Spezia dockyards, his confidence was unjustified, and he was subjected to a good deal of adverse criticism. The *Popolo Romano*, which vigorously defended the Minister, said it could not understand how so valuable a servant of the State came to be so violently and unfairly attacked. Admiral Mirabello has since died. His successor in the ministry is Admiral Bettòlo.

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Battle-ships.

The Dante Alighieri, first of the series, was laid down at Castellammare on June 6, 1909, but it is said work had to be suspended owing to some mistake having been made with regard to her framework or armouring. She is to be launched on September 20th. It is stated that she will displace about 21,500 tons, and will be armed with ten or twelve 12-in. guns, eighteen 4·7-in., and twelve or more 12-prs. The speed has been given as 23 knots, but this is uncertain. The ship will have three submerged torpedo tubes. In round figures the following amounts have been provided for her in the years named: 1908–9, £120,000; 1909–10, £800,000; 1910–11, £600,000. It is hoped that the ship will be completed for trials in 1912. For the sister ship Conte di Cavour, which is to be built at Spezia on the slip vacated by the Roma, no more than about £132,000 will be taken up to the end of the financial year 1909–10, followed by £120,000 in 1910–11. For the Giulio Cesare and Leonardo da Vinci no provision is made in 1909–10, but it is intended to take about £200,000 for each in 1910–11, so that they may be put in hand. They are to be built respectively by Ansaldo, Armstrong & Co., and Odero.* The battleships Napoli and Roma have been completed, and are now in commission. On their three-hours' trials these ships made mean speeds respectively of 22·5 knots with 19,700 I.H.P., and 22 knots with 21,000 I.H.P.

Armoured cruisers.

Particulars were given of the trials of the armoured cruiser Pisa in the last volume of the *Naval Annual*. The trials of the sister vessel Amalfi, which was built by the Odero firm at Genoa, were equally satisfactory. The contract speed was 22·5 knots, but the cruiser attained 23·64 knots as the mean of a three-hours' trial, the coal consumption being 750 grammes per horse-power per hour, while the contract allowed 900 grammes. The mean horse-power developed was 20,800. The Amalfi also made a twelve-hours' trial at 21 knots Both cruisers have joined the Mediterranean Squadron. The San Giorgio and San Marco, both launched at Castellammare, have suffered through delay in delivering their armour plates, and have not passed through their trials. They are expected to join the Fleet respectively in 1910 and 1911.

Scouts.

The three new scouts are to be vessels of 3600 tons, and are to be built at Venice and Castellammare. The Quarto has been put in hand at Venice, and a sum of £254,000 has been provided for her, but a beginning will be made with the Marsala and Nino Bixio in the financial year 1910–11. These vessels will probably be armed with 4·7-in. guns and 12-prs.

* It is said that they are to have three triple and two double turrets on the centre line.

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Messrs. Ansaldo, Armstrong & Co., of Sestri Ponente, launched the destroyers Alpino on November 27, Corazziere on December 11, and Pontiere on January 3. They complete, with the Bersagliere, Granatiere, Artigliere, Lanciere, Carabiniere, Fuciliere, and Garabaldino, a flotilla of ten destroyers of 380 tons. Ten others are to be built, increased in size, it is believed, to 500 tons. Destroyers.

Messrs. Pattison, of Naples, launched in April and May, 1909, the sea-going torpedo-boats Calipso and Climene, which are to be completed this year. They belong to the Cigno class, 200 tons, modified for naphthaline stoking. Torpedo-boats.

On June 6 was launched at Venice the submarine Tricheco, being the last of the group of five boats, which also includes the Glauco, Squalo, Narvalo, and Otaria. Twelve additional submarines are to be built. The Fiat-San Giorgio Company, of Muggiano, near Spezia, has eight boats in hand (241–297 tons, 13–8 knots), fitted with heavy oil-combustion motors—six supplied by the Fiat (Fabbrica Italiana Automobile) and two from other sources. These boats are to have a surface range of action of 650 miles at 13 knots, 1300 miles at 8 knots, and submerged range at 4 knots of 75 miles. Submarines.

In view of the fact that combined manœuvres on a large scale took place in 1908, and in consideration of the catastrophe at Messina, it was decided that the Fleet operations of 1909 should be entirely of a tactical character. The forces engaged numbered thirty-five vessels of all classes, and while the battleships and cruisers were mostly employed in tactical exercises, and in resisting torpedo attacks, the small submarine flotilla was independently exercised at Venice. The operations included observation, scouting, movements of opposing forces, pursuit, and the defence of the Strait of Otranto against the passage of an enemy's torpedo-boats. Manœuvres.

The suppression of the Naples dockyard has at length been decided on, and Spezia, Castellammare, Taranto, and Venice will be the only Government establishments. The two first-named are much more important than the others; and it is hoped that the suppression of Naples may enable greater energy to be developed in those yards. Admiral Bettòlo hoped to increase also the importance of Venice. Dockyards.

Austria-Hungary.

The annexation of Bosnia and Herzegovina caused the Austro-Hungarian squadron to be mobilised and made ready for instant operations, the main force being stationed at the time in the Bocche di

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Cattaro, while the Danube flotilla was mobilised at Buda-Pest. The men whose time normally expired were not allowed to depart, being retained for a fifth year of service with the fleet; on March 15th the whole fleet was mobilised, and it is interesting to record that the Reserve Squadron was ready for action within twenty-four hours, and the rest of the ships within four days. Reservists to the number of 10,000 were embodied, and the absentees were only five per cent. of the total, while it had been expected that twenty per cent. of the men would be unavailable. The demobilisation began in the middle of April.

The naval programme.

A naval programme was prepared for presentation to the Delegations which would involve the opening of a credit of nearly £20,000,000, proposed to be covered partly by expanding the ordinary votes and partly by supplies from the extraordinary budget. The scheme provides for the constitution of a fleet of sixteen battleships, constituted of two squadrons, each squadron being accompanied by two scout cruisers, and in addition there would be monitors for the Danube, and torpedo flotillas. The notable feature of the scheme is that armoured cruisers disappear from the establishment, as in the new French Organic scheme. The Monarchs, Habsburgs, Erzherzogs, and the ships of the new Franz Ferdinand class (making twelve in all) would constitute the fleet of sixteen, with four Dreadnoughts, which it is proposed to build. The old ships would be replaced according to an age scheme, and some of them would merely be kept on the establishment of the main fleet *pro forma*, as has been the case with the small German coast-defence ships under the Navy Law. As to the new armoured cruisers Kaiser Karl and St. Georg, they would be in commission, and might join the fleet as substitutes for two of the older vessels or replace ships in dockyard hands. The Admiral Spaun is the type of scout cruiser, and three others would be built.

The scheme was discussed at conferences of Ministers in September, but its presentation to the Delegations was deferred, and there is some doubt as to its complete acceptance. Presumably, however, one of the Dreadnoughts will be begun this year, and the Stabilimento Tecnico Triestino, which is building the Franz Ferdinands very rapidly, has expressed its readiness to lay down such a ship, and to complete her within 30 months. A combination of this establishment with the Austrian Lloyd yard at Trieste has taken place, with increased capital. Large building slips will be formed, and an imperial coaling station created on a considerable scale.

New battleships.

The battleships now completing have been built from the designs of Herr Siegfried Popper, and the engines are from the plans of

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Herr Gustav Lendecke and Herr Anton Demal. The Erzherzog Franz Ferdinand, launched 1908, is about to begin her trials. The Radetzky, launched on July 3rd, 1909, will be completed for trials towards the end of the year. The last of the class, the Zrinyi, was to be launched on April 12th. These ships displace 14,226 tons, and are 451 ft. long, with 80 ft. 5 in. beam and 26 ft. 6 in. draught. The protection is represented by a total weight of 3070 tons of armour. The main water-line armour extends for a length of 279 ft., and has a maximum thickness of 9 in.; it descends 4 ft. 6 in. below the water-line, and rises 5 ft. 9 in. above, and is continued to the bow and nearly to the stern with 7·5-in. plating. Above this range is 6-in. plating for a length of 279 ft., continued forward by thinner plating, and at the ends of the thick plating there are armoured 6-in. bulkheads. The armour deck has a maximum thickness of 2 in. For protection against torpedo attack, the hull is constructed of two thicknesses of special steel. The ship has two conning-towers, severally with 9·8-in. plating (forward) and 4·7-in. (abaft). The armament consists of four 12-in. 45-calibre guns in double turrets, eight 45-calibre 9·4-in., twenty 50-calibre 3·9-in., six 12-pr., and two machine guns. Two 12-in. and four 9·4-in. fire ahead, and the same number astern, while four of each calibre are available for broadside fire. The 12-in. guns are protected by 9·8-in. steel barbettes, and the 9·4-in. guns by 7·8-in. The torpedo armament consists of three submerged tubes. The turret-turning, ammunition-hoisting, and boat-hoisting gear are all worked by electric power. The propelling machinery consists of two vertical four-cylinder triple-expansion engines, with 12 Yarrow water-tube boilers, with Howden's forced draught apparatus, which, with 20,000 I.H.P., are to give a speed of 20·5 knots. The bunkers have a capacity of 1350 tons of briquettes, sufficing for a range of 5600 miles at 10 knots. The complement of the ships will be 816 officers and men.

Proposed Dreadnoughts.

Plans for the intended battleships of Dreadnought type have, it is understood, not yet been completed, but, according to the *Zeit*, they will cost about £2,360,000 each. A speed of 22 knots is mentioned, and the armament has been variously given as ten 12-in. and twenty-four 4·2-in., or eight 12-in., ten 9·4-in., and twenty smaller. Propulsion would be by turbine engines.

Scout cruisers.

The turbine scout cruiser Admiral Spaun was launched at Pola on October 30, having been seventeen months on the stocks. Displacement, 3,500 tons; length, 416 ft. 8 in.; beam, 42 ft.; draught 15 ft. 6 in.; armament, seven 3·9-in. and two machine guns; 20,000 I.H.P.; speed, 26 knots. The cruiser has thin side armour

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(2½ in.), 2-in. bulkheads, and a ¾-in. deck. She is to be completed this year.

Torpedo flotilla.

All the 400-ton destroyers have been completed. They have been constructed on the plans of the Huszar, which was built by Messrs. Yarrow, and have Yarrow water-tube boilers. Fourteen sea-going torpedo boats of 200 tons have also been delivered, of which the Kaiman was built by Messrs. Yarrow and the others at Trieste and by the Danubius Works at Fiume, at which yards others are being built to complete a total of 24. Twelve boats of a smaller class (110 tons) for coast defence are building at Trieste and the Danubius yard, numbered I. to XII. Nos. I. to VI. have been delivered. The first of the series attained at her acceptance trials a speed of 28·9 knots on a three hours' run with 2640 I.H.P. and 410 revolutions. The contract speed was 26 knots. A mother-ship for torpedo boats and submarines, the Gaea, has been bought in Russia, being a merchant vessel of 13,000 tons, which has been converted at Pola for her special uses. A depôt and cistern-vessel for naphtha transport for submarines, now named the Vesta, has also been bought.

Sub-marines.

The submarine flotilla consists of boats U 1 and U 2, Lake type, built at Pola; U 3 and 4, completed at the Germania yard, Kiel; and U 5 and 6, completed by Messrs. Whitehead and Co., at Fiume. The following are particulars of the Germania boats:—Displacement, surface, 237 tons, submerged, 300 tons; length, 142 ft.; beam, 12 ft. 6 in.; two screws; surface speed, 12·5 knots (oil engines, 440 H.P.), submerged speed, 8·5 knots (electric engines); two bow torpedo tubes. The Whitehead boats, which have made very satisfactory speed trials (9·88 knots submerged, electric propulsion; 11·36 knots surface, with gasoline engines), also diving trials (5 minutes, and 3½ minutes from the awash trim), and under-water running trials, steering being easy and variation of direction trifling.

JAPAN.

The expansion of the Japanese Navy, which has been somewhat retarded by financial stringency and owing to a better understanding with the United States, is being brought about by a triple arrangement of programmes. There is (I.) the *ante-bellum* programme, involving the laying-down of vessels having an aggregate displacement of 100,000 tons, at a cost of about £10,000,000, to be spread over eleven years, ending in 1913, but since expanded to 1916. There is next (II.) an emergency programme, which has been described by the word "implementing," to make good the losses in the war, and to be paid for out of special war funds. The third programme (III.) is

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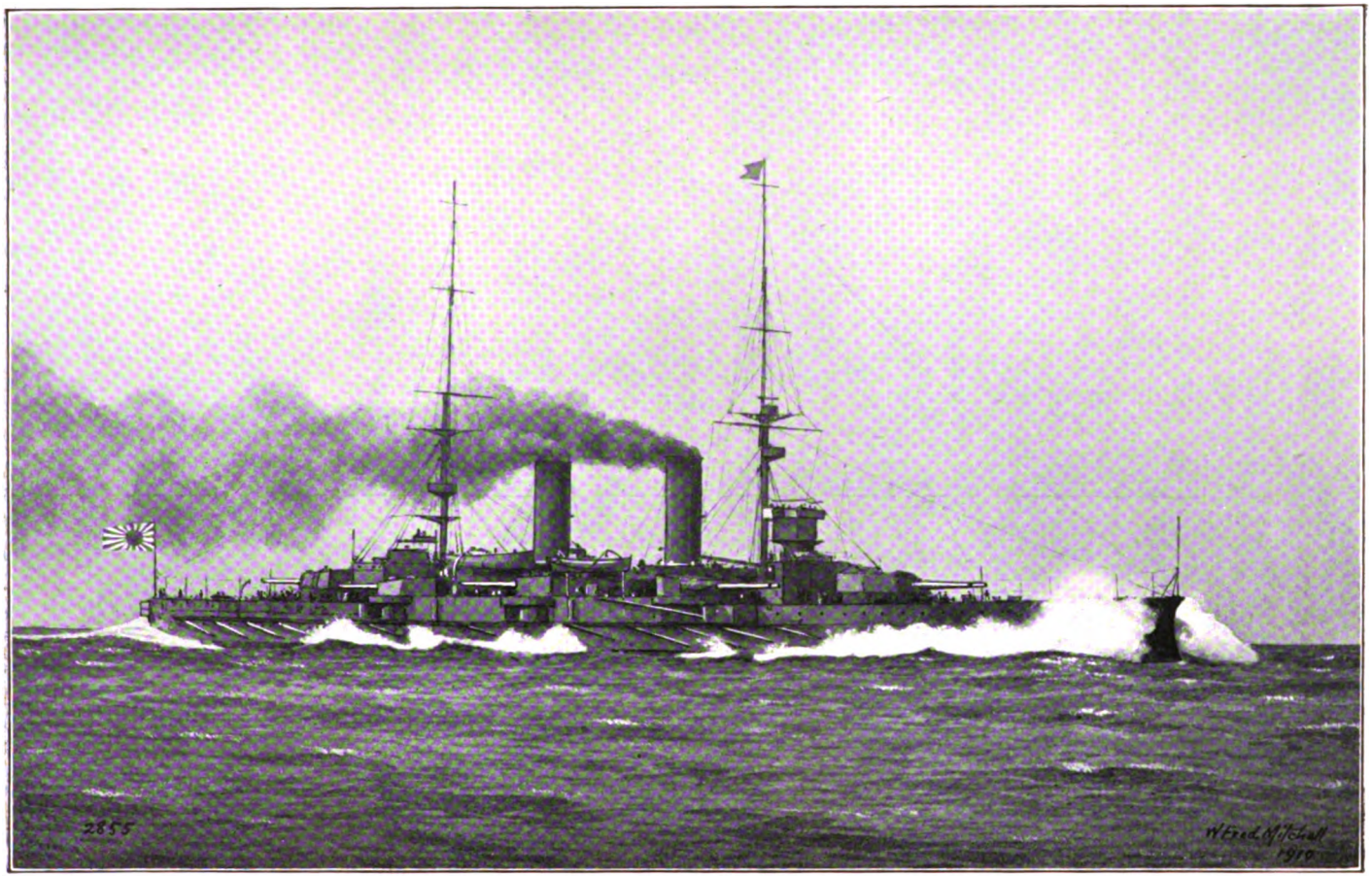

JAPANESE BATTLESHIP "SATSUMA."

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supplementary to the last, and is of like character. The following tabular statement shows the situation :—

Programmes.	I.—*Ante-Bellum* Programme.		II.—Emergency Programme.		III.—Supplementary Programme.		Totals.	
	Built.	To be built.	Built.	To be built.	Built.	To be built.	Built.	To be built.
Battleships ...	2	1	2	—	2	—	6	1
Armoured Cruisers	1	2	3	1	—	—	4	3
Other Cruisers ...	—	2	1	2	—	—	1	4
Despatch Vessels...	—	—	2	—	—	—	2	—
	3	5	8	3	2	—	13	8

The ships built under Programme I. are the Katori and Kashima (battleships), and the Ibuki (armoured cruiser); those under Programme II., the Aki and Satsuma (battleships), the Tsukuba, Ikoma and Kurama (armoured cruisers), the Tone (scout cruiser), and the Yodo and Mogami (despatch vessels); those under Programme III., the Kawachi and Settsu (battleships). Programme II. also includes 29 destroyers. It is probable that the Programmes may be modified, and that instead of building one battleship and three armoured cruisers, four vessels of the same class will be built.

Progress of construction.

The battleship Satsuma and the armoured cruiser Ibuki have joined the fleet; the Aki and the armoured cruiser Kurama are to conclude their trials in the spring or early summer of 1910. The battleships Kawachi and Settsu, which are building at Kure and Yokosuka on the slips vacated by the Aki and Satsuma, are intended to be completed in 1911. They were laid down respectively on January 18 and April 1, 1909.

Battleships.

The *Jiji Shimpo* says that the Kawachi and Settsu will displace 20,800 tons, with a length of 480 ft., 84 ft. beam, and 28 ft. mean draught. According to this authority the armament will be ten 12-in. (the Dilke return says twelve), ten 6-in., and twelve 4·7-in., with five torpedo tubes. Turbine engines of the Curtis type and 26,500 I.H.P. are to develop a speed of 20·5 knots. They are to be launched in October. Another of this class is to be built.

Armoured cruisers.

According to the *Japan Times* the armoured cruisers Ibuki and Kurama were to be improvements on the Black Prince class, but have been modified on the lines of the Invincible. The Ibuki has passed through her trials with great success, but the Kurama has been

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somewhat delayed, it is said owing to the inability of the Kure ordnance factory to turn out the guns and mountings in time. She is to be completed in 1910. The Ikubi was supplied with Curtis marine reversible turbines, built by the Fore River Company, of Quincy, Mass., which also supplied Curtis turbines for the battleship Aki, while Japanese yards are building Curtis turbines for the Kawachi, Settsu and three scout-cruisers. Three trials were conducted, one under cruising conditions at two-fifths power, one at full power, and one at overload conditions at maximum power. In each trial the turbines worked well, and the steam consumption was less than the contract.

The following are particulars:—

	Brake H.P.	Revs. per minute.	Mean Speed.
Two-fifths power trial	10,077	189	16·95
Full power trial	21,000	235	20·0
Final trial	27,142	250	21·0 (?)

The maximum guaranteed horse-power was 21,600.

Scout cruisers. With regard to the scout cruisers of the Tone class referred to above, it is said that one will be built at the Mitzubichi yard, Nagazaki, another at the Kawasaki yard, Kobe, and a third at Sasebo dockyard. Nothing is known of the fourth vessel indicated in the programme. The later vessels will be larger than the Tone—4800 tons or more.

De-stroyers. Japan, like other countries, is looking for a more powerful and better sea-keeping class of destroyers, or rather of "destroyer-smashers." One of a new class, analogous to the Swift, was launched in October and received the name of Kaifu (sea-wind). She displaces 1200 tons, has engines of 20,500 I.H.P., and a speed of 35 knots. She carries one 4·7-in. and four 3-in. guns. She has three torpedo tubes. Another report says her armament consists of two 3·9-in. and five 12-pdrs. The Umikaze, built at the Mitzubichi yard, is of the same class, and others are in hand or contemplated. The 380-ton destroyers, Uranami, Isonami, and Ajanami, have been completed.

Personal changes. Vice-Admiral Togo has retired from his appointment of Commander-in-Chief of the Japanese Navy, and has been succeeded by Vice-Admiral Baron Ijuin, who as a Rear-Admiral had his flag in the Asama at Spithead on the occasion of the Coronation Review. The two squadrons of the fleet are now under the command of Vice-Admirals Kamimura and Shimamura.

Esti-mates. The Estimates for 1910 amount to £3,899,211 (increase £226,000) ordinary charges, and £3,708,870 (decrease £108,130) extraordinary

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charges, making a total of £7,608,081, and an increase, as compared with 1909, of £118,000. The large increase in the ordinary estimates is mostly due to the greater cost of the fleet in commission, and increased pay of officers and men. In the extraordinary estimates are charges for a proving ground for big guns and a torpedo range, the latter at Kure, and for further work at the new war harbour of Chinkaiwan, the latter absorbing £55,230. The sum allocated for the year, from war funds for the emergency programme, is £929,520, and is additional to the estimates.

Dock.

A dry dock for the largest ships is being constructed at Kure.

Mishaps.

Several disasters and mishaps occurred last year. The battleship Fuji and armoured-cruiser Tokiwa went aground in February, involving considerable repairs. Torpedo-boats Nos. 24 and 29 were seriously injured in collision in March, and in May No. 50 suffered machinery damage. In July there was a gun explosion in the Asahi, by which five were killed and four injured.

Russia.

The Duma and naval expansion.

Since the publication of the last volume of the *Naval Annual*, little progress has been made in the reconstruction of the Russian Navy. The Duma has insisted that a complete change in the system of administration and in the condition of the building yards must be brought about as the preliminary of all progress, and it has urged the naval authorities forthwith to enter upon the necessary reorganisation. Credits for the building of battleships were struck out of the Estimates, but, by a special arrangement, supplies to the extent of £340,000 were provided so that a beginning might be made. The Duma Committee believed that the Admiralty and Baltic yards were not in a position to build large modern ships within a reasonable time, and that the cost of construction in Russia was nearly 40 per cent. more than in some foreign centres.

Delayed construction.

Progress with the vessels has been very slow and uncertain. In discussing the Navy Estimates of 1910, the Duma Committee noted the delay or impossibility, as it believed, of carrying on the work with Russian material. Of a sum of £2,200,000, which had been sanctioned for shipbuilding purposes without the Duma's assent, two-thirds had been expended on the equipment of yards and the purchase of materials, but the actual work had been *nil*. Even the designs were not yet finally settled, and the Izhora works, it was averred, would find it impossible to deliver the gun turrets and plates for the next ten years. The Russian Admiralty did not, however, admit the accuracy of the statements, and said that the ships would

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be completed in 1913. The total cost of each is estimated at about £2,800,000, of which 13 per cent. has been provided.

Admiralty changes.

There have been some changes at the Admiralty, and several committees have been formed. One is concerned with financial and economical questions concerning shipbuilding and bases; and another, under the presidency of the Minister of Marine, has for its object to secure the co-operation of the various branches of the Navy. There is in addition a Staff Tactical Committee which deals also with some gunnery matters. The Naval Academy has been reorganised with a new system of entry, and the rank of senior lieutenant has been created. Submarine boats and wireless telegraphy have been placed under the Inspector of Torpedo Services.

Keels of battleships laid.

The four battleships above referred to of the Dreadnought class were laid down with the customary religious ceremonies on June 16—the Sevastopol and Petropavlovsk at the Baltic works, and the Gangut and Poltava at the Admiralty Yard. The guns and gun-mountings are to be supplied by the Obukoff works, the armour by the Izhora works, and the turbine machinery by the Franco-Russian and Baltic works. There had been great difficulties in selecting the designs, and many foreign firms had been consulted. Messrs. John Brown & Co., of Clydebank, entered into a contract, of which the particulars have not been disclosed, but they are acting as consulting engineers. The following characteristics of the new ships are given:—Displacement, 23,000 tons; length, 590 ft. 6 in.; beam, 87 ft.; draught, 27 ft. 3 in.; armament, twelve 12-in. (mounted, it is said, in four triple turrets on the centre line), sixteen 4·7-in., four 3-pr., and eight machine guns, four submerged torpedo tubes; Yarrow boilers and Parsons turbines (four screws); 42,000 I.H.P.; speed, 23 knots; maximum coal capacity, 3000 tons.

Rurik.

The armoured cruiser Rurik, now the flagship of Admiral Essen in the Baltic, has passed through her period of twelve months' guarantees by the builders, and the captain and officers of the ship have expressed their satisfaction with the perfect working of the propelling machinery and the ordnance, and with the manner in which the whole contract has been completed by Messrs. Vickers, Sons and Maxim.

Torpedo-craft.

Five destroyers of 850 tons are building in the Black Sea at the Nikolaieff yard. These were provided for in 1908. The submarine boats Akula and Minoga have been completed at St. Petersburg, and the latter has gone through her trials. Three boats provided for in 1908 are to be built in the Black Sea. The submarine Kambala was sunk in June in collision with the flagship Panteleimon near

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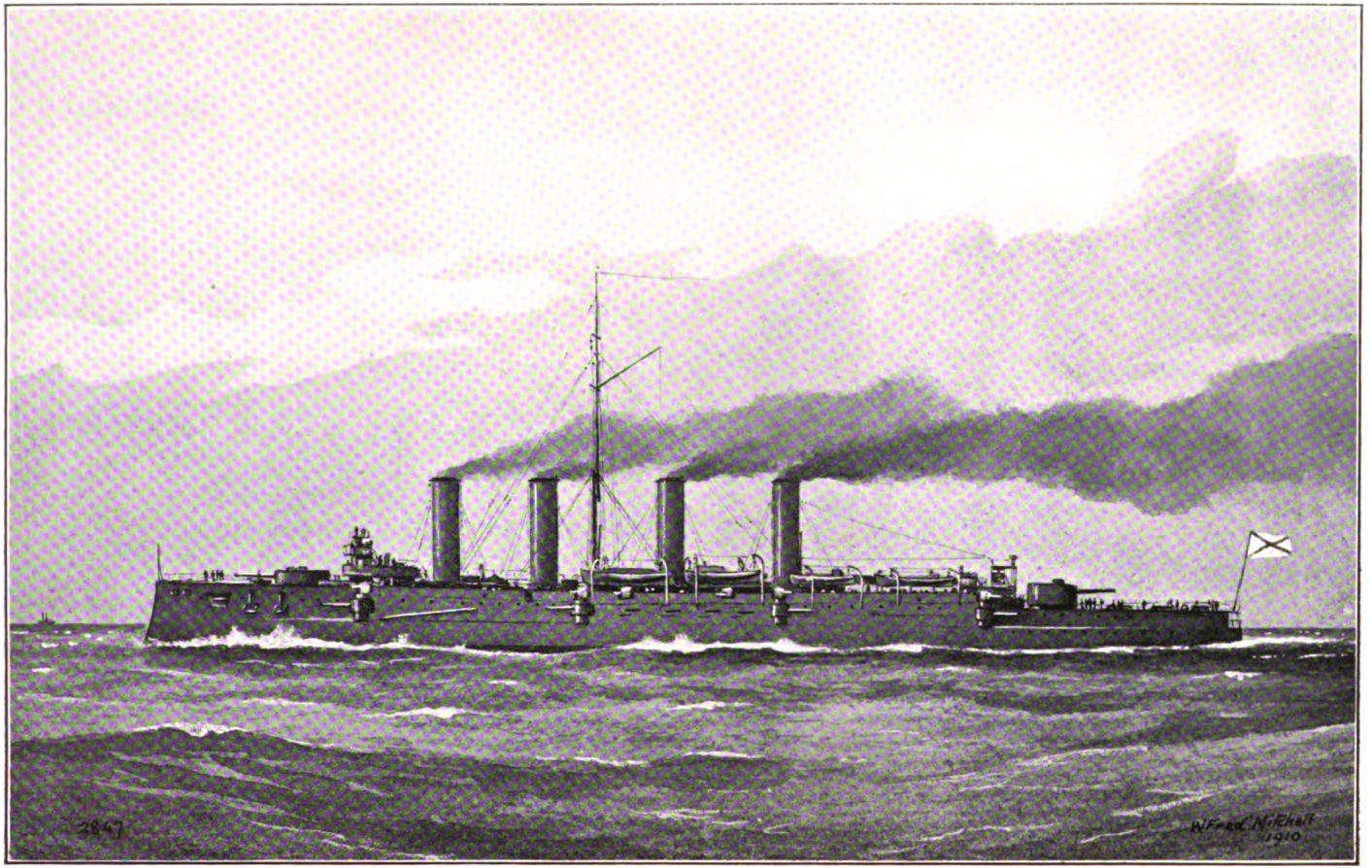

RUSSIAN ARMOURED CRUISER "ADMIRAL MAKAROFF."

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Sevastopol, and Captain Beilkin, commanding the submarine division, another officer and 18 men were drowned. The disaster was caused by the misunderstanding of a helm signal. The hull has since been raised. There was also an explosion in the submarine Drakon, by which 17 men were seriously injured.

Gunboats.

The only vessels launched have been the gunboats Kars and Ardagan for the Caspian flotilla. Eight gunboats are building for the Amur.

Estimates 1910.

The Estimates for 1910 amount to a total of £10,219,766, including £4,788,537 for shipbuilding and repairs, and £1,227,400 for armaments. It is understood that an organic scheme for the expansion of the Fleet covering a long period of years will be presented to the Duma.

Volunteer Fleet.

It was proposed to transfer the Volunteer Fleet entirely to commercial purposes, but the new Minister of Commerce has not adopted the scheme of his predecessor.

United States.

The year has been one of great importance for the United States Navy. The matters relating to it fall mainly under the heads of (1) central and dockyard reorganisation; (2) new construction and trials; (3) *personnel.*

Navy Department reorganisation.

In relation to the first of these, Mr. Meyer, Secretary of the Navy, in his annual report (December 4th, 1909) illustrated by a figure the then existing situation at the Navy Department, administered as it was by several bureaus and special boards, mainly consisting of departmental chiefs who advised the Secretary. He said it was as if a railway organisation, after the completion of the track and the rolling stock, and the formation of business and financial departments, had no branch provided for working its traffic. "An operating division of the Fleet is a branch that has been lacking in the Navy Department."

> The direction of the Fleet, its operation, its preparedness for war, have been carried out without adequate methods. The General Board has advised the Department on important matters and has long since proved its usefulness, but it has been without responsibility for carrying out its recommendations. The Bureau of Navigation, without specific authority over the other Bureaus and with its own duties to occupy it, has only in part supplied the lack of suitable machinery for directing the operations of the Fleet and its preparedness for war. It has, when called on, advised the Secretary, and has prepared the orders and directions necessary for the general management of the Fleet.

Naval "Aids" for the Secretary.

The Secretary added that the business had outgrown the personal co-ordinating powers of the Secretary, and that assistants were required for his professional guidance, who should be advisers only, without directing or executive powers. Effect has been given

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provisionally to his views, and in order to put an end to some confusion and overlapping of duties the Bureau of Equipment has been abolished and its duties distributed. The assistants of the Secretary are known by the title of "Aids." The Aid for Operations (Rear-Admiral R. Wainwright) is to advise the Secretary as to strategic and tactical matters in conjunction with the General Board, and also regarding the movements and dispositions of naval vessels. He prepares the necessary orders for the Secretary's signature, covering the above matters. The Aid for *Personnel* (Rear-Admiral W. P. Potter) advises on matters which fall under the Bureau of Navigation, the Bureau of Medicine and Surgery, the office of the Judge-Advocate-General, and the Naval Examining and Retiring Boards. He also has cognisance of matters affecting the Naval Militia. The Aid for Material (Rear-Admiral W. Swift) advises generally on matters concerning the construction, arming, equipment and supply of naval vessels and the management of navy yards. This includes specific matters which belonged directly to the former Bureau of Equipment and the Bureau of Ordnance, Bureau of Construction and Repair, Bureau of Steam Engineering and Bureau of Supplies and Accounts. The Aid for Inspections (Captain A. Ward) advises on all inspections ashore and afloat coming under the Board of Inspection and Survey for ships, the Board of Inspection for shore stations, and the special inspecting officers.

It was expressly stated that the duties of the Aids could not be executed "without an entirely broad view, each of his own field of activity, and without any participation in the details of the Bureaus." In order further to relieve the Secretary of routine business the functions of the Assistant Secretary have been enlarged. Mr. Meyer has based his reorganisation mainly on the recommendations of the Swift Board, which was directed to digest previous reports and opinions, and to present a comprehensive plan for continuing the reorganisation begun by Mr. Newberry, the previous Secretary. His scheme of reorganisation is undergoing a year's trial, and is expected to receive legislative sanction, though a large part of it would be capable of being put into effect by executive order.

Dockyard reorganisation.

Mr. Meyer had also greatly interested himself in the work and organisation of the dockyards, and his remarks on the subject are of great interest. He had been impressed with certain benefits of the principle of consolidation put in force by his predecessor, but the experience of the past nine months had convinced the Department that some extension and modification of the system was necessary.

It must be accepted as cardinal principles that the preparation of the vessels of the battle fleet at Navy Yards, for their ultimate function and their maintenance in

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good working order when away from Navy Yards, are above all other considerations. . . . The Navy Yards exist on account of, and for, the Fleet. To develop its entire preparedness, the battle fleet should be under sea conditions and sea training as much as possible, and at Navy Yards for the minimum time. To reduce the time spent at Navy Yards, the officers of the Fleet should have both shop training and sea experience, in order to enable them to make the Fleet self-sustaining as far as possible. And conversely in the Navy Yards, it is imperative that there shall be the most intelligent comprehension of the conditions and necessities in the cruising ships. This combination of training and experience at sea, and in Navy Yard shop practice and mechanical processes, will enable the officers not only to keep the ships in condition economically, but to make their requests and suggestions for improvements conservative and practicable as a result of such experience.

Southern yards, the Panama Canal, and the Pacific.

Mr. Newberry had signed an order closing certain of the Southern Navy Yards, but this has now been suspended. The closing of the yards was in the direction of economy, but it required legislative action, and was, moreover, a matter requiring further consideration. The Department was not entirely convinced that the Government could advantageously give up sites on which large expenditures have been made, until after the opening of the Panama Canal, when it could be definitely demonstrated which are likely to be of the greatest value.

The completion of the Panama Canal, the development of trade in the Gulf of Mexico and the whole Caribbean region, and the probable increase of the naval establishment to meet our national responsibilities in that area, will probably call for supply stations, in part for the heavy fleet, but principally for the torpedo craft and submarines and the smaller vessels needed there. In the past separate Boards have taken up the question of establishing Navy Yards in special localities, usually in response to directions from Congress. The Department proposes in the near future to take up the question of their importance and the necessity of extending or curtailing the different Navy Yards, with a due regard for the interests involved and the probable needs of the future from a strategic point of view. Our docking and repair facilities on the Pacific coast are now scarcely adequate for the naval force there. The Pacific Ocean is growing in importance, and with the opening of the Panama Canal will undoubtedly become the scene of greater commercial and naval activity. An increase in the facilities on the Pacific coast for coaling, docking, and repair of naval vessels is therefore a matter requiring action in the near future.

The Joint Board considered the whole strategic field of the Pacific, and recommended the maintenance of a small docking and repair station at Olongapo in the Philippines, but that the chief naval base in the Pacific should be at Pearl Harbour, Hawaii, where docking facilities for the largest vessels are being completed. Considerable demands are made for docks in other places.

Dockyard system.

As to the system at the Navy Yards, the plan of Mr. Newberry is to some extent modified. The single manufacturing department he established is to be sub-divided into a machinery division and a hull division, each under a manager. The commandant of the yard, a naval officer of the executive branch, is made the actual and general manager, and to him all orders relating to naval, civil, or industrial features of the yard will be sent. He is to be, in fact, the sole representative of the Navy Department. Commandants and captains of yards are to be selected for their knowledge and experience of their

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particular duties, and their tenure of office is to be long enough to ensure continuous administrative policy. An entirely new feature is the establishment of a permanent and separate accounting system under the commandant. This system has been already tried at the Boston Navy Yard, of which the commandant was Rear-Admiral Swift, and has been found successful. It is claimed that it will enable the work of the Navy Yards to be compared with similar work of outside firms and of each other, and will thus create a practical standard of economy.

New construction.

Turning now to the subject of new construction, we find the United States Navy strong in its belief in the all-big-gun type. Two battleships of the class are to be built to complete a homogeneous squadron of eight ships of this general type, the others being the Delaware, North Dakota, Florida, Utah, Arkansas, and Wyoming, and a repair ship is to be built to accompany the squadron, as well as two colliers. But the new ships are to be bigger (27,000 tons) and to be armed either with twelve 12-in., as in the Arkansas, or ten of the new 14-in. guns, which have been tried with success. The House of Representatives voted this programme on March 1st. At a private conference the Secretary is reported to have outlined to the Naval Committee of the House his plans for laying down, next year, two ships of 32,000 tons, armed with 14-in. guns, and costing severally £3,600,000, as compared with £2,200,000 for the ships of 1910.

Battleships.

The Michigan and Delaware classes have already been described in the *Naval Annual*. The four vessels are now in commission. The South Carolina finished her official trial runs off the Delaware Capes on August 27. On the four-hour endurance run, she consumed 1·4 lb. per I.H.P. On each of the two twenty-four-hour runs she consumed 1·5 lb. In seventeen runs over the measured mile the highest speed attained was 20·52 knots. The average for the five highest speed runs was 19¼ knots, the requirement being 18½ knots. During the deep-water run at sea of four hours she averaged 18·88 knots and burned 1·39 lb. of coal per horse-power.

Delaware and North Dakota competitive trials.

Great interest attached to the trials of the Delaware and North Dakota because they are sister ships fitted with different propelling machinery. The Delaware, built by the Newport News Company, which has reciprocating engines, exceeded her contract speed of 21 knots on her runs over the measured mile course in Penobscot Bay on October 22 and 23. The weather conditions were favourable. Three runs were made at 19 knots, three at 20·50 knots, and five at the maximum of 21·98 knots. The official figures are: Speed, 21·563; revolutions, 128·38; I.H.P., 28,578; coal per hour,

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53·945 lb.; water for all purposes, per I.H.P., main engines, 14·8 lb.; water, per I.H.P., main engines only, 13·42 lb.; coal per I.H.P., main engines, all purposes, 1·887 lb.; coal per I.H.P., main engines and auxiliaries, estimated, 1·83 lb.

The sister ship, North Dakota, built by the Fore River Company, has Curtis turbines. Her trials were very successful, though on the four hours' run, owing to a burst tube, some men were severely scalded and certain boilers had to be disconnected. The following comparison between the performances of the Delaware and North Dakota has been furnished by the Fore River Company, which supplied the Curtis turbines of the latter.

	North Dakota.	Delaware.
Fastest run over measured mile	22·25	21·98
Average of five high runs	21·83	21·44
Full power trial speed	21·64	21·56
,, ,, horse-power	31,400	28,600
,, ,, coal consumption, tons per day .	583	578
Nineteen-knot trial coal consumption, tons per day .	295	315
Twelve-knot ,, ,, ,, .	105	111

It has been pointed out that the Delaware on the 19 and 12 knot runs, worked at higher speeds, and that for a just appreciation the coal consumption should be reduced to the same basis. On the other hand the coal consumption of the North Dakota, on the full-power trial, represented a somewhat higher speed than was attained by the Delaware. It would be unsafe to attempt to establish any definite conclusions on these trials, especially in view of the fact that the United States Navy Department is adopting Parsons turbines for the later battleships. The Delaware, first of American Dreadnoughts to be completed, was handed over by the builders on February 15.

Arkansas class.

The following are the features of the Arkansas and Wyoming: 554 ft. long, 93 ft. 3 in. beam, 28 ft. 6 in. draught, 26,000 tons displacement, 28,000-H.P., 20½ knots speed, 1650–2500 tons coal supply, armament of twelve 12-in. guns, twenty-one 5-in., four 3-pr., and two torpedo tubes. Fittings in recent United States battleships are for 21-in. torpedoes. The armour is to be 11 in. on belt and barbettes and on sides 8 in., and the ships are to carry a complement of 1115 officers and men. Two of the turrets will be set forward on the forecastle deck, which will have 28 ft. freeboard, the guns in the first turret being 34 ft. above the water, and those of the second about 40 ft. Aft of the second turret will be the conning-tower, and then will come the fore fire-control tower or lattice mast, with searchlight towers carried on it. Next will come the forward funnel, on each side of which will be two small open rod towers with strong searchlights. Then will come

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the main fire-control tower and the after funnel and another open tower with searchlight. The two lattice steel towers are to be 120 ft. high and about 40 ft. apart. The four remaining turrets will be abaft the main funnel, the third turret having its guns 32 ft. above water; those in the other turrets about 25 ft. above the water. The guns will be the new 50 calibre type. All twelve will have broadside fire over a wide arc, and four can be fired right ahead and four right astern. The *Army and Navy Register* made the following comment: "It was by the decision of the Department that Parsons turbines were designated for use. The fact is recognised that it is impossible to determine within any reasonable time whether the Curtis turbine has a superiority over the Parsons type. There is some expectation that the trials of the Salem may develop some surprises as to the efficiency of the Curtis turbine, but this will not be decided for many months to come, and meantime the new ships must be laid down and built. And even then the possible superiority of the Curtis turbine is speculative at this time. It was, therefore, thought wiser, in view of all consideration, to decide on the Parsons turbine." The cost of the Arkansas will be £964,000, exclusive of armour and armament.

Rapidity of construction.

Remarkable rapidity is being attained in building battleships in United States private yards, as the following facts show:—Michigan, contract July 20, 1906, delivered Aug. 31, 1909; South Carolina, contract July 21, 1906, delivered Nov. 5, 1909; Delaware and North Dakota, contract Aug. 6, 1907, delivered, the first on March 1st, and the second in the middle of March, 1910, some months ahead of contract time. The Florida, Utah, Arkansas and Wyoming are to be delivered within thirty-two months. It is probable that the Utah, which is being built by the New York Shipbuilding Co. in competition with the Florida at the New York Navy yard, will be ready within thirty months. She was launched on December 23.

Lattice masts.

The special lattice masts, or towers of heavy steel tubing, have now been installed in a great many vessels. The following have one each:—Idaho, Massachusetts, Minnesota, Mississippi, Missouri, Nebraska, Ohio, Rhode Island, Virginia and Wisconsin. The following vessels have each two of these towers:—all the Dreadnoughts, and the Connecticut, Louisiana, Georgia, Kansas, New Jersey and Vermont. It is stated that these lofty towers, topped as they are by platforms, not being rigid, sweep at times through considerable arcs on service, leading in some cases to sea-sickness, and making observation sometimes impossible.

Fleet speed trials.

The following are Fleet speed trials, contrasted with contract and acceptance speeds, from a written report from Rear-Admiral Seaton

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Schroeder, commander-in-chief of the Atlantic Fleet, the record being up to January 23rd, 1910:—

	Contract.	Acceptance trial.	Four hours' trials 1909–10.
	knots.	knots.	knots.
Connecticut	18	18·78	19·02
Minnesota	18	18·85	18·42
New Hampshire	18	18·16	18·52
Kansas	18	18·09	18·96
Georgia	19	19·26	19·05
Nebraska	19	19·06	19·11
Mississippi	17	17·11	17·02

Destroyers.

The destroyers Flusser, Reid, Smith, Preston and Lamson (700 tons) have been delivered. They have Parsons turbines. Fifteen others (742 tons, 29·5 knots) are in various stages of advancement, and will have Parsons turbines (ten), Curtis (three) and Zoelly-Cramp turbines (two). The Flusser made on September 1st a record of three knots faster than any vessel in the United States Navy. Her fastest mile was at the speed of 33·7 knots; another run was at 33·4 knots. The average of five top-speed runs was 32·7 knots; on the four-hours' trial 30·4 knots. The contract speed was 28 knots. The Reid attained on October 9th a speed of 31·85 knots an hour on a four-hour run, completing her tests of speed and coal and water consumption. Her maximum speed was 34·5 knots.

Submarines.

The submarine Snapper has been under trial and others are nearly ready. The Bonita, Grayling, Narwhal, Stingray and Tarpon were delivered in 1909. These and ten others are of the Holland type, with variations. In addition, the Seal, of the Lake type, is well advanced (500 tons). Four others, Nos. 28 to 31, were authorised by Congress, March 3rd, 1909, as were Nos. 1 to 3 of a new type known as the "sub-surface destroyer," which are to be built by a company having a speciality in this line. Still another boat, the Thrasher, of the Laurenti type (358–456 tons, 14–9½ knots), with four tubes for 18-in. torpedoes, is being built at Philadelphia by Messrs. Cramp, on account of the Fiat San Giorgio Company of Muggiano, near Spezia, Italy. Four submarines are approved in the programme of 1910.

Reconstruction of vessels.

It is proposed to expend about £750,000 on the reconstruction of vessels of the United States Navy. The Maine will be put in hand at Portsmouth, N.H., and the Kearsarge at Philadelphia, these two vessels absorbing about £250,000 between them. The Illinois will be reconstructed at Boston, the Alabama at New York, and the Kentucky at Norfolk. Smaller sums are to be expended on the Tennessee, Washington, Albany and Chester. It is intended to

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raise the old Maine, now lying, an increasing obstruction to navigation, in the harbour of Havana. A correspondent says it is easier to obtain money from Congress for "modernization" than for new construction. The Chicago and New York are cases in point, the latter having received new armament of recent pattern, and both vessels are now much more powerful than when they were built.

Personnel. Age of senior officers.

Turning to the *personnel* of the United States Navy, it has to be recorded that the Department is about to present a comprehensive plan for reorganisation. The cruise of the battle fleet brought home still more strongly to the authorities the urgent need of providing for younger officers in the higher ranks. In order to illustrate the disadvantage under which the United States Navy suffers, and for which it is intended to provide a remedy, Mr. Meyer has had prepared the following interesting comparative table of ages, which was taken on January 1st, 1910, except that the German table refers to 1906 and the Japanese to March 1st, 1909:—

	England.	France.	Germany.	Japan.	United States.
	Yrs. Mths.	Yrs. Mths.	Yrs. Mths.	Yrs. Mths.	Yrs. Mths.
Admiral of the Fleet.	67 11	—	—	—	—
Admiral	60 10	—	59 0	59 1	—
Vice-Admiral . . .	58 2	61 6	54 0	53 6	—
Rear-Admiral—					
Oldest	—	—	—	—	61 11
Average	53 1	58 3	53 0	52 3	60 8
Youngest . . .	—	—	—	—	58 9
Captain—					
Oldest	53 6	60 0	—	—	61 1
Average	—	—	47 0	43 9	55 5
Youngest . . .	36 5	40 10	—	—	50 5
Commander—					
Oldest	50 0	57 10	—	—	54 9
Average	—	—	42 0	40 5	47 10
Youngest . . .	32 0	42 0	—	—	40 2

Execution of engineering duties by executive officers.

The Secretary's remarks on the training of "line" or executive officers, and the execution of engineering duties are of great importance, and deserve to be quoted:—

> At the Naval Academy all line officers are given what is probably the best technical education furnished by any school in this country. The graduates of such schools are naturally fit to undertake subordinate engineering duties of all sorts. This theoretical education is supplemented, at least during the first five years of service, by alternate periods of duty on deck and in the engine-room. All such duty is engineering duty in fact. Almost every act of the line officer aboard ship has to do with machinery and with engineering. In his duties in the engine-room, in turrets, and at guns, and in electricity, he is constantly in charge of the operations of complicated machinery, and by training and the direction of the men handling the different machines and engines, and in his deck duties, he is trained in administration. This continuous performance of engineering duty has fitted, and is fitting, officers for the duties of senior engineer of our vessels, with the result that the motive machinery of the Fleet is in excellent condition.
>
> This excellent general education and practical experience has not, however,

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qualified officers for the important work of designing the machinery of our vessels, and the department has met this need at an opportune time by the establishment of a post-graduate school of engineering at Annapolis that will, it is believed, provide fully for the needs of the Service in this particular. As the older and experienced engineer officers of the line of the Navy retire from active service, the officers trained in the school of engineering will take their places and continue to fill the duties which have been so ably performed by them.

Certain officers of the line of the Navy are also annually designated for post-graduate instruction in ordnance and electricity, and officers who are to become navigators are given a course of compass instruction in the compensation and practical working of the compass.

It is intended to form an effective Naval Reserve. Reserve.

SECONDARY NAVIES.

ARGENTINA.

The Argentine shipbuilding programme is an answer to the Brazilian. Two battleships and twelve destroyers are to be built, and are already in hand or being prepared for.

The battleships are the Moreno and Rivadavia, for which the contract was secured, after one of the keenest competitions ever known in warship building business, by the Fore River Company of Quincy, Mass., where one of the battleships will be built, the other being put in hand by the New York Shipbuilding Co. Upon this success, Rear-Admiral Francis T. Bowles, president of the Fore River Company, received warm and well-deserved congratulations. The principal warship-builders of the world had been asked to submit designs, which about twenty of them had done, and the designs had been twice revised. This competition excited a great deal of discussion. Professor Biles, in the course of a letter to the *Times*, made a comment which was significant, and which deserves to be quoted here. He remarked that the competition could not be regarded as a commercial transaction only.

No shipbuilder in this country can separate the knowledge which he acquires in the building of ships for the British Admiralty from the rest of his knowledge. We may assume that the British battleships embody good ideas and good practice—in all probability the very best. These cannot fail, in a greater or less degree, to become part of the designs which the British shipbuilder first submits to the Argentine Government. In the second inquiry it may be presumed that everything that was good in the first proposals had been seized upon by the Argentine authorities and asked for in the new design. This second request went not only to British builders but to all the builders of the world, and in this way it is exceedingly probable that a serious leakage of ideas and practice of our ships was disseminated through the world by the Argentine Government. The British builders, in replying to this second inquiry, would, in all probability, point out that some of the things are impracticable, or have been tried and found undesirable in the British Navy, and the Argentine authorities would be informed on additional matters which have come under the builders' knowledge by their acquaintance with British practice. The third inquiry that was issued showed to all the builders of the world what has been eliminated or modified in the second inquiry; and so the process of leakage went merrily on, and with it that of the education of foreign builders and the Argentine Government.

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In some quarters the result was ascribed to the vigorous commercial policy of the State Department acting through the Latin-American Bureau, which had secured contracts for the two Dreadnoughts at a total approximate cost of £4,400,000. Admiral Bowles, however, ascribes the award of the contract to his company to the character of its work, its ability to carry out the terms of the contract, and the superiority of the design.

The following are the characteristics of the battleships Moreno and Rivadavia: Displacement, 28,000 tons; length, 578 ft.; beam, 95½ ft.; normal draught, 27 ft. 9 in.; armament, twelve 12-in. 50-calibre guns in six barbettes, twelve 6-in. 50-calibre, sixteen 4-in., and ten smaller; two 21-in. torpedo tubes; protection, main belt, 12 in. to 10 in., side above belt, 6 in. and 9 in.; bulkheads, 9 in.; deck, 3 in. and 2 in., heavy gun positions, 12 in. and 8 in., secondary guns, 6 in.; Babcock and Wilcox boilers built by that firm; Curtis turbines (three screws); 39,500 B.H.P.; coal capacity, 1600 tons normal, 4000 tons maximum. The Bethlehem Steel Co. will make the guns and armour plate. The ships are to be completed in 1911.

The armoured gunboats Paraná and Rosario, both built at Elswick, have undergone very successful steaming and gunnery trials.

Of the twelve turbine destroyers which are to be built four have been ordered in England (Messrs. Cammell, Laird), four in France (De la Brosse et Fouché), and four in Germany (Germania, two, and Schichau, two). The eight boats to be built in England and France will have White-Forster boilers. The guns for the whole series (four 4-in. 50-calibre for each) are to be made by the Bethlehem Steel Co., and will be interchangeable with the smaller armaments of the battleships. The magazine capacity will be 250 rounds. The destroyers are to displace approximately 900 tons, and there are slight differences between them. They will be required to maintain a speed of 32 knots during a six hours' trial, and to have a range of 3000 miles at 15 knots. They will have four Whitehead torpedo tubes, for 12-in. torpedoes running at 41 knots at a range of 2000 metres, and 29 knots at 5000 metres. They are to be completed within twelve to fourteen months. A further destroyer programme is contemplated.

Brazil.

The Brazilian Navy programme of 1907 provided for an establishment of 26 vessels, approximating to an aggregate displacement of 80,000 tons and to a cost of £8,000,000. The vessels included were three battleships—the Minas Geraes, built at Elswick, which has left for Brazil, the Sao Paulo, launched at Barrow, April 19th, and the

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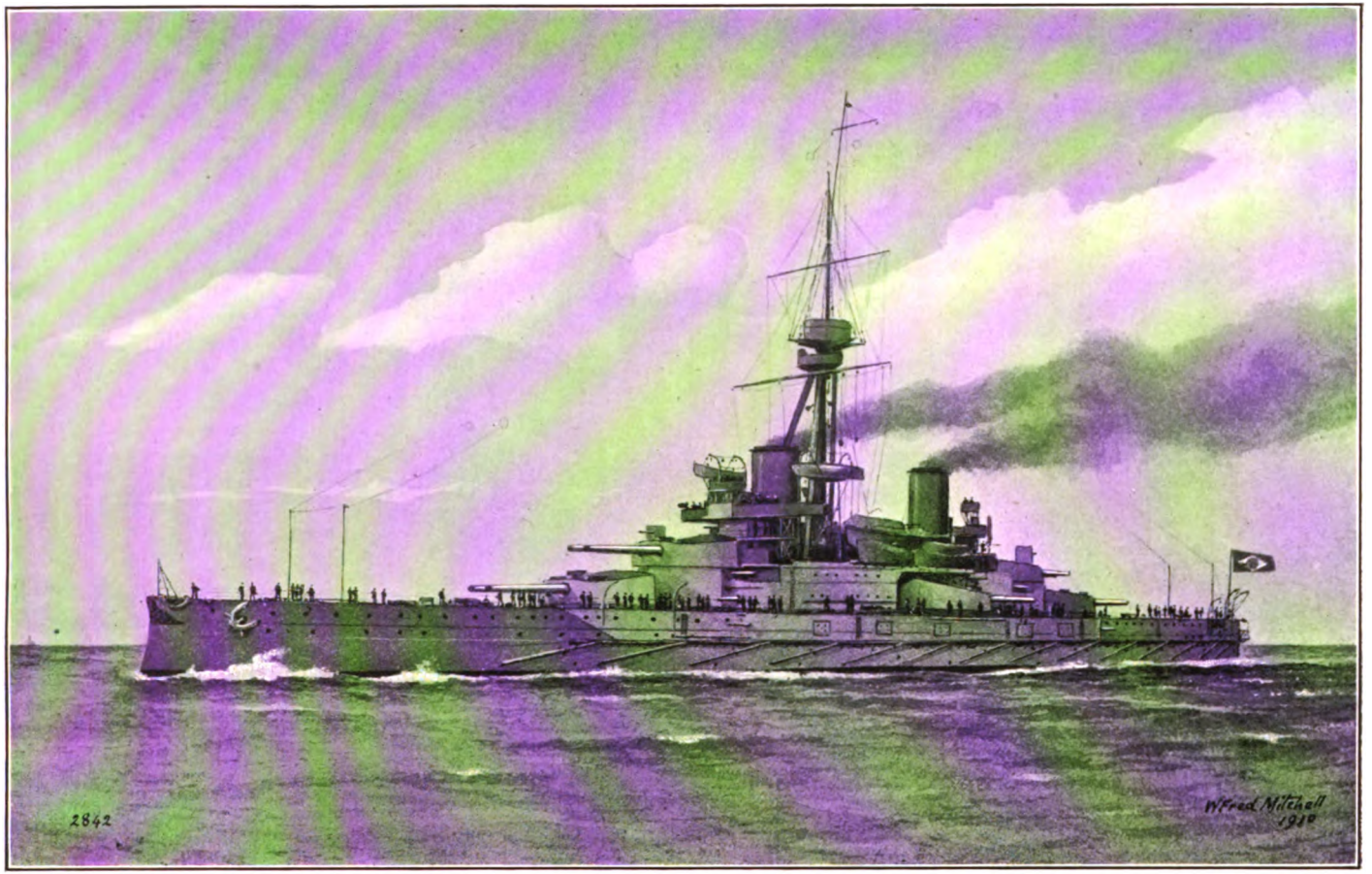

BRAZILIAN BATTLESHIP "MINAS GERAES."

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Rio de Janeiro, which has been laid down at Elswick; three scouts—the Bahia and Rio Grande do Sul, built at Elswick, and another to be built; 15 destroyers, being ten built by Messrs. Yarrow, and five yet to be built; three submarines; one mining vessel, and one surveying vessel. With the exception of the third battleship, it is expected that all the vessels put in hand will have been delivered by July, 1910. Two armoured gunboats were being considered for the Budget of 1910. The programme of 1907 replaced that of 1904, and Admiral Alexandrino de Alencar, Minister of Marine, in his report to the President of the Republic, 1909, pointed out that though Brazil will obtain three of the finest battleships in the world (instead of three smaller ships and three armoured cruisers) the cost of construction for the whole fleet will be nearly £1,000,000 less, and the ships' complements will absorb 7730 men, as compared with 5020 for the 1904 programme. He also pointed out that the cost of the Minas Geraes being £1,821,400, the cost per ton was £94·47, which compared favourably with the cost of similar vessels in other countries. The Dreadnought, he said, had cost £101·28 per ton. In relation to this matter it may be noted that the cost of the St. Vincent, Collingwood, and Vanguard has fallen to £88·115 per ton.

The trials of the Minas Geraes were throughout a brilliant success. The steaming trials extended from September 14th to 29th, and the following is a summary of the results:—

—	Speed.	Revolutions.	Indicated Horse-Power.
	knots.		
48-hours' trial at 10 knots	10·468	66·3	2,495
Average of six measured-mile runs on 10-knots trial	10·623	67·28	2,683
30-hours' trial	19·13	126·9	16,177
Six measured-mile runs on this trial	19·35	128·26	16,353
8-hours' natural-draught trial	20·762	137·85	21,265
Mean of six runs on this trial	20·863	138·5	20,948
Full-power forced-draught trial at 250-lb. pressure, mean of six mile runs	21·189	146·07	25,519
Forced-draught trial at 280-lb. pressure . . .	21·432	147·47	27,212

The gun trials excited great interest, because upon a limited displacement, without diminution of speed, greater gun-power was provided than in the Dreadnought. Some little apprehension existed in the minds of gunnery officers as to the effect the blast of the guns in the rear might have on the crew of the forward (and lower) turret, and representatives from several foreign Governments attended the firing tests. The observations made when the rear pair of guns were fired showed that the gun crew might have remained in the forward

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gunhouse without suffering inconvenience, although the muzzles of the guns fired were only 4 ft. or 5 ft. above the roof of the turret. The heavy plating of the roof proved amply strong. A remarkable test was the simultaneous firing of the ten 12-in. guns on the starboard beam. The projectile used in each was of 850 lb. weight, the charge in each gun being 285 lb. of cordite. This was an unprecedented performance, and the ship stood the stress admirably. All the other gun tests were equally satisfactory.

The supervision of the construction of the Minas Geraes and other Brazilian ships under construction, was presided over successively by Admirals Proenca and Bacellar, who expressed the fullest satisfaction with the results. In regard to the construction of the Minas Geraes and São Paulo, the following remarks from *Engineering* deserve to be quoted:—

In this work the two firms of Sir W. G. Armstrong, Whitworth, and Co., Limited, and Vickers, Sons and Maxim, Limited, have combined, and the Brazilians in obtaining this co-operation have secured a professional experience which is without parallel. The two firms have done more work in the building of modern battleships than any other two establishments in the world, and, moreover, have the capacity for the construction of every unit which goes to make up the battleship of to-day. It is true that the Minas Geraes has occupied about two years and six months to build, but within that period there was on the Tyne a strike of five months' duration, which greatly delayed the work, so that if we reckon working time alone, the vessel has been built within two years. A similar performance has been achieved in connection with the São Paulo, which is being completed at the Vickers, Sons and Maxim Company's Works at Barrow-in-Furness. It has to be borne in mind, moreover, that this performance has been achieved notwithstanding that there have been in process of construction simultaneously in these two works five ships of the line, of the Dreadnought type, a record which has no parallel with any other two firms. At the same time, also, the two firms named have been engaged in the building of the guns and gun-machinery, not only for these ships, but for several others for the British and foreign Governments, and yet their resources have not been taxed to anything like their full capacity.

The scouts Bahia and Rio Grande du Sul, which have been completed, have already been described in the *Naval Annual*.

The ten destroyers built by Messrs. Yarrow, at Scotstoun, 550 tons, have been described. All are in the water, some are in commission in Brazil, and others are nearly completed. The Alagoas made her official trials on the Skelmorlie measured mile on November 26th in boisterous weather, and the contract speed of 27 knots for three hours was easily obtained, carrying a load of 100 tons. The Parahyba attained a speed of 27·29 knots. The Santa Catharina easily exceeded the contract speed.

The naval programme provides also for the reorganisation of the Rio de Janeiro arsenal, which is to be removed to the Ilha dos Cobras, in the bay. Tenders have been called for quay walls and a dry dock for the big battleships. Messrs. Vickers, Sons and Maxim are also constructing a floating dock of 23,000 tons capacity, which is to be delivered before the end of the year.

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CHILE.

There appears to be an intention on the part of the Chilian Government to adopt a naval programme, concerning which various statements have been made. It is said to include a battleship of 20,000 or 22,000 tons, four or more destroyers of 900 or 1000 tons, a mining vessel, and two submarines. The total outlay is set down at about £3,000,000.

CHINA.

Prince Tsai-hsün, brother of the Regent and uncle of the Emperor of China, with Admiral Sah Chen-ping and Sir Chentung Liang Cheng, constituting a special commission, arrived in England in November for a three weeks tour of inspection of the dockyards and most of the great private yards in the country. The members of the commission subsequently visited France, Germany, and Russia. It is proposed to enter upon the creation of an Imperial Navy, and according to intelligence given by the *Pekin and Tientsin Times*, the reconstruction will begin with a survey of existing squadrons, and a reorganisation of dockyards and naval schools. The provincial viceroys are said to be unanimous in their desire to create a navy, and are believed to wish to "complete" it—presumably a restricted programme—by the seventh year of the present Emperor. The Peiyang, Nanyang, Hupei, Fuhkien, and Kwangtung flotillas are to be surveyed, and presumably useless vessels to be eliminated. Various classes of gunboats will then be built mainly for police duties on the coasts and rivers. The dockyard reorganisation will include the provision of new machinery, and this work and the reorganisation of the schools will occupy the first year. The second year will, it is said, see the building of destroyers and of a few despatch vessels, and the building of a naval college and gunnery establishment. Possibly the visit of the commission implies the building of some larger vessels.

DENMARK.

The scheme of national defence proposes an establishment of five coast-defence ships of the Olfert Fischer class, 24 torpedo-boats or submarines, and two 500-ton mine-layers. The programme covers a period of five years. The Peder Skram is to be completed during the first two years, and the fourth ship before the conclusion of the period. The Dikkeren, an electrically-driven submersible, has been delivered by the Fiat San Giorgio Company, Muggiano, Spezia. Length, 114 ft. 3 in.; beam, 11 ft.; displacement, 103–130 tons; speed, 12–7½ knots. Two screws are actuated by electric motors. Two other boats are to be built by the Whitehead Company, of Fiume.

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Greece.

The most notable event in the history of the Greek Navy was the mutiny at Salamis, led by Commander Typaldos. The real or ostensible object was to procure the removal of one vice-admiral, two rear-admirals, and fifteen captains, said to be too old or otherwise incapable of executing their duties, and to secure the reinstatement of one or two officers who had been dismissed the Service. The destroyers Naukratoussa and Sphendoni (both built at Poplar) came out in the hands of mutineers from the Salamis arsenal on Oct. 29, apparently with the object of attacking the loyal squadron. The Sphendoni fired one shell, and the ships let down their nets, but Typaldos had no torpedoes charged. One man was killed and another was wounded on board the Hydra. Three shells struck the Sphendoni, one piercing a boiler pipe, whereby two engineers and three stokers were scalded to death. The other destroyer was not damaged. Both withdrew, the Sphendoni was beached, and the mutineers fled.

On Nov. 12 the Minister of Finance demanded in the Chamber authorization for the expenditure of £1,200,000 on naval armaments. Of this amount £1,000,000 will be expended mainly on a new armoured cruiser of about 10,000 tons, the purchase price of which was £950,750, under the contract signed with the firm of Orlando Brothers, of Leghorn, while £200,000 will be devoted to the purchase of torpedo boats and ammunition. The amount demanded included upwards of £280,000, bequeathed by M. Averoff, for the employment of which the consent of the Chamber was required, while the remaining sum was to be raised by loan. The cruiser launched March 12, and named the Giorgio Averoff, will be a sister of the Italian Pisa and Amalfi, with some improvements. She is to be ready for trials in August. Her principal armament will be of the latest Armstrong 9·2-in. pattern of 45 calibres. The speed will be 24 knots with accelerated draught, and she will be fitted with two reciprocating engines and twenty-two Belleville boilers with economisers. She will have tripod masts, as in recent British ships, and two principal fire-control stations. Internally she will be fitted for the reception of forty-eight midshipmen and cadets, with study rooms, it being the intention to use her for training purposes.

Netherlands.

The Estimates for 1910 amounted to £60,000 more than last year, and provide for two destroyers for the Netherlands East Indies, a submarine, two mining vessels, and a submarine salvage vessel. Two destroyers for the East Indies were sanctioned in 1909. Displacement, 415 tons; 230 feet long, 20 ft. 6 in. beam; Yarrow boilers, two

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triple-expansion engines, 7500 I.H.P.; 30 knots, bunker capacity, 95 tons; range at economical speed, 2600 miles; four 12-pr., two tubes for 18-in. torpedoes; 80 officers and men. The boats are to be completed at the end of the year.

The Scheldt Company at Flushing laid down the submarine voted in 1909. Displacement, 132–147 tons; speed, 11–8 knots; two tubes for 18-in. torpedoes. She is of the Luctor et Emergo type.

After reconstruction at Flushing, the coast-defence ship Kortnaer realised on her trials 4400 I.H.P., the contract being 4000 I.H.P.

The coast-defence ship Zeven Provincien, 6525 tons, was launched at Amsterdam, March 16, 1909.

NORWAY.

The submarine Kobben has been completed at the Germania yard, Kiel, and arrived at Horten under convoy on December 12, having done well at sea in bad weather. She has been constructed from the plan of M. d'Equevilley, a French engineer, and is 131 ft. 6 in. long, with 14 ft. 9 in. beam, and a displacement of 205 tons (surface) and 255 tons (submerged). The armament consists of three tubes, two forward and the third abaft, for Whitehead hot-air torpedoes, which can be discharged electrically from the conning-tower. There are two periscopes, which reflect the view upon a darkened glass plate. The boat navigates on the surface by means of two petroleum motors (together, 440 S.H.P.), her speed being 12 knots. Under water the screws are actuated by electric motors (250 H.P.), and the speed is 9 knots, being one knot more than the contract. The petroleum supply suffices for a range of 1450 marine miles, and the submerged range is considerable. The boat has a strong inner hull, resisting pressure at a depth of 262 ft., and upon this the conning tower is built. The outer hull gives the submarine the general form of a torpedo boat, and provides space for ballast and petroleum tanks. There is a 4-ton drop keel.

A torpedo boat was provided for in 1909.

PORTUGAL.

The mine-layer Vulcano was launched by Messrs. Thornycroft at Southampton—110 ft. long, 19 ft. 6 in. beam, 11 ft. depth, 400 I.H.P., 12 knots, one revolving 18-in. tube aft. The vessel has two sets of torpedo-dropping gear at the break of the forecastle, and there is a mine hold at the stern, with a pair of electrically operated sheer-legs for launching mines. The range of the Vulcano is 1000 miles at 10 knots. She is schooner-rigged, and has a derrick on the foremast for hoisting torpedoes.

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Spain.

Programme.

The features of the programme of Spanish naval construction, which includes three battleships, four gunboats, three destroyers and twenty-four torpedo boats, to be carried out by the Sociedad Española de Construccion Naval, under the direction and responsibility of Sir W. G. Armstrong, Whitworth & Co., Messrs. Vickers, Sons & Maxim, and Messrs. John Brown & Co., were given in the *Naval Annual* last year.

This Anglo-Spanish Company has already well advanced the work of bringing the dockyards at Ferrol and Cartagena up to date, and has already made good progress in the building of the vessels. The construction of a large graving dock at Ferrol, together with the dredging of the harbour and basin, has been sub-let to Sir John Jackson, Limited, who already have the work well in hand. The dock will be approximately 600 ft. by 100 ft.

Battleships.

The battleships have been named España, Alfonso XIII, and Jaime I. They will each have a displacement of about 15,460 tons, and will be 435 ft. long with 78 ft. 9 in. beam. They will be protected at the water line by 9-in. armour extending to 4 ft. 9 in. below the level, and extending over the machinery and magazine spaces. At the ends the thickness will be reduced to 4 in. and 3 in. Above the water-line belt the sides will be protected by 6-in. armour. The barbettes for the eight 12-in. guns will be of 10-in. armour. In addition to the main armament twenty 4-in. guns will be placed amidships in a 3-in. armoured citadel. The horizontal top of the citadel will be protected by 1½-in. armour, and a curved armoured deck 1 in. to 2 in. in thickness will be fitted near the water line extending all fore and aft. The machinery and magazines will be protected against torpedo explosion by longitudinal armoured bulkheads 1½ in. in thickness. The vessels will be driven by Parsons turbines, the designed speed being 19½ knots. The boilers will be of the Yarrow type. The range of action at economical speed will be 7500 miles. The keel of the España was laid on December 6, 1909, and that of the Alfonso XIII. on February 23, 1910, both at Ferrol. The Jaime I. will be laid down in 1911.

Gunboats.

The four gunboats (which, together with the torpedo craft, are to be built at Cartagena), the Recalde, Laya, Bonifaz, and Lauria, will be 200 ft. long by 30 ft. in beam, and about 800 tons displacement. They will each be armed with four 3-in. guns and two Maxims. The designed speed is 13 knots. Yarrow type boilers and reciprocating engines have been adopted, the latter to develop 1100 H.P. Two of the boats were laid down in 1909.

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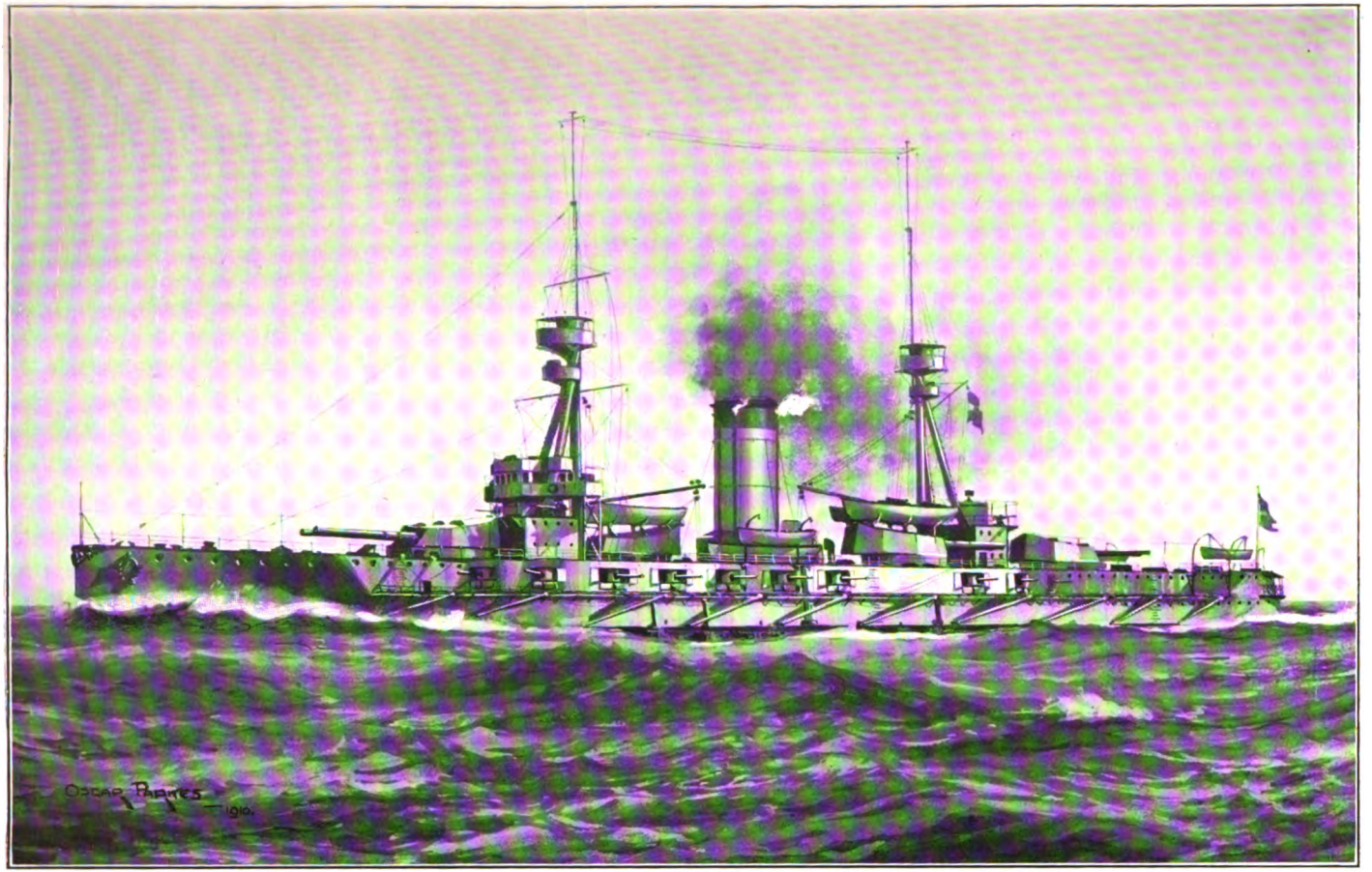

SPANISH BATTLESHIP "ESPAÑA."

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The destroyers will be named Bustamente, Villamil, and Requesens, and their speed will be not less than 28 knots. They will be commenced in 1910, and will have a displacement of 370 tons, with 220 ft. length and 22 ft. beam. Each destroyer will be armed with five 6-pr. guns and two 18-in. tubes. Turbine engines of 6250 H.P. and modified Normand boilers will be used. Destroyers.

The torpedo-boats, of which several are in hand, will be capable of steaming 26 knots, and will each be armed with three 3-pr. guns and three 18-in. tubes. The dimensions of the boats are 165 ft. by 16 ft. 6 in., and 180 tons. They will be driven by turbines of 3750 H.P., and the boilers will be of the Normand type. Torpedo-boats.

The following facts in regard to the awarding of the contracts, based on British designs, will be of interest. The Spanish Naval Committee, according to their official report, took cognizance in respect of ordnance, of the range, the rate of fire and accuracy, the energy developed, the height of the gun platform, and the simplicity, trustworthiness, and convenience of the gun-mountings. The British design provided for eight 12-in. 50-calibre guns, in four barbettes; two on the centre line with a wide arc of training, and two on the broadside, mounted *en échelon*, the machinery to be hydraulic. According to the official report, the rate of fire guaranteed was two rounds per minute, as compared with one round per minute in the German plans. The arrangements of the magazines were also considered superior, offering greater facility in working the guns with fewer men. The British design also provided that the guns should be loaded at all angles of training and elevation; whereas, in the case of the German guns it was necessary to bring the guns back to a central position for loading purposes.

SWEDEN.

No step has been taken to give effect to the programme which proposed the building of four 8000-ton battleships. The Defence Committee has more recently expressed itself in favour of a type of coast-defence ships of 6800 tons, not drawing more than 21 ft. 6 in. of water, protected by $7\frac{3}{4}$ in. of steel at the water-line, carrying four 11 in., four 7·6 in., and several 4·2 in. guns, and having a speed of 22 knots.

The destroyer Munin is in hand at the Kokum yard, Malmö, and is to be completed next year: 430 tons, Curtis turbines, 30 knots. She is a sister of the Hugin, Vidar, Ragnar, Sigurd, Magne and Wale. The torpedo-boat Arcturus attained a speed of 25·88 knots (contract, 25 knots) on December 8, on a three hours' trial; and the Antares of

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25·44 knots. Four others of the class, 110 tons, are in hand, and four more are provided for.

The Fiat San Giorgio Company delivered in 1909 the submersible Hvalen (a sister of the Italian Foca) which made a record journey of 4000 marine miles without escort from Spezia to Stockholm, calling *en route* at Cartagena (790 miles in 77 hours), Gibraltar, Lisbon, Oporto, Vigo (to shelter from a gale), Ferrol, Brest, Portsmouth, Ymuiden and Kiel. She left Spezia on July 31, and arrived at Stockholm on October 2. The displacement is 185–235 tons, and the speed 15–7½ knots. Three Fiat marine motors, using benzine, actuate three screws. The cruising range at 9¾ knots is 1200 miles. The boat is fitted with two tubes for 18-in. torpedoes. Three other submarines were provided for in 1909.

Turkey.

On February 14th, 1910, the Chamber of Deputies sanctioned the Bill providing for the execution of the naval programme prepared by Rear-Admiral Sir Douglas Gamble, involving an annual expenditure of £T500,000 for a period of ten years. It is believed that the programme provides for the purchase of two battleships or armoured cruisers, three other cruisers, and ten destroyers, most of them to be constructed in British yards. A national subscription is on foot for naval purposes. In regard to the destroyers, it is announced that four turbine boats of 600 or 700 tons, of the German type, have been purchased from the Schichau works at Elbing.

Rear-Admiral Sir Douglas Gamble resigned his appointment as Naval Adviser to the Ottoman Government on account of ill-health. The Admiral has set the training on a new footing. He has cruised with the existing fleet at sea, and has laid down a scheme for progressive reorganization. He has been succeeded by Rear-Admiral H. P. Williams, who will advise and be responsible for the training of officers and men. It is intended to send a number of officers to England for training.

Uruguay.

The Vulcan Company is building at Stettin a small cruiser for the Uruguayan Government: 1150 tons, 265 ft. 9 in. long, 31 ft. 2 in. beam, 10 ft. 4 in. depth; two 4·7-in. 45-calibre, four 12-pr., and twelve Maxim guns; two 18-in. deck torpedo tubes; ¾-in. side protection of nickel steel; 8000 I.H.P., two screws, 23 knots; coal, 90–220 tons; complement, 120.

John Leyland.

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CHAPTER III.

Comparative Strength.

In 1906 the expenditure on new construction of Great Britain was double that of Germany. During 1909–10 the three principal naval Powers have devoted the following sums to new construction:—

	£
Germany	10,756,734
Great Britain	10,256,194*
United States	10,015,101

The fact that Germany, but for the Supplementary Estimate, would have spent £500,000 more on new ships than Britain is the most significant feature of the year under review. The German Navy is rapidly improving its relative position. During 1909–10, for the British Navy, five battleships have been completed and two (one a cruiser-battleship) have been launched; for the German Navy two battleships have been completed and three launched; and for the United States Navy four battleships have been completed and two launched.

In France steps, described in the previous chapter, have at last been taken to place the organisation of the French Navy on a sound footing, and an Organic Law or programme of new construction on the plan of the German Navy Acts has been adopted. Four battleships of the Danton class were launched during the year, and three of the class should be completed by the end of 1910. Two new battleships are to be laid down in 1910, though efforts are to be mainly concentrated in completing the ships which have been so long in hand. The Organic Law prescribes the creation of a fleet of twenty-eight battleships, forming four squadrons of six ships each, with four as a reserve. This programme is to be completed by 1919. It is criticised as the renunciation of any attempt on the part of France to compete with the German Navy, but the resources of France are not equal to those of Germany, and the Navy proposed will throw very considerable weight into the scales in any future naval combination.

In Russia four battleships of the largest size were officially laid down in June, 1909; but it is doubtful whether their construction is being prosecuted with vigour. None of the four battleships launched in 1906 or 1907 has yet been completed, and it will be many years

* Excluding Supplementary Estimate of £689,100.

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before the Russian Navy again becomes a factor to be reckoned with. In Italy one battleship was completed, one laid down, and three have been authorised. Two of the latter will probably be commenced before the end of the current year. The Italian Navy suffers much from the dilatoriness of construction. The Austrian Navy is progressing steadily, but the two big battleships proposed last year have not been laid down. Straitened finances have had their effect on Japanese naval policy, but one battleship was completed; and two battleships of 20,800 tons were laid down in 1909. The Argentine Republic, as was to be expected, is following the example of Brazil, and has placed the order for two battleships in the United States.

Ships in commission. Britain.

The number of battleships in full commission for the British and German navies remains about the same as last year. The British Home Fleet and the German High Sea Fleet each comprises 16 battleships. The First Division of the Home Fleet has been strengthened by the substitution of the Superb and Temeraire for the Formidable and Implacable, which have been transferred to the Atlantic Fleet. The Collingwood, St. Vincent, and Vanguard have been through their trials, and by the time these pages are published will probably also have been added to the Home Fleet, the First Division of which will then consist exclusively of Dreadnoughts or Agamemnons. Every ship in the Home Fleet, whether in the First or Second Division, may be fairly considered more powerful than any ships in the German Navy with the exception of the Nassau class. The First Cruiser Squadron has been reduced to four ships by the transfer of the Minotaur to China. The Atlantic Fleet has been strengthened by the substitution of four Formidables for the Albion and three Duncan class, two of the latter being transferred to the Mediterranean. The Canopus class have now disappeared from our active fleet.

The Third Division of the Home Fleet comprises eleven battleships, viz., Bulwark, Albemarle, and nine Majestic class, nine first-class, four second-class and five third-class cruisers, six torpedo gunboats, three destroyer flotillas, each consisting of eighteen to twenty-five destroyers, and twelve torpedo boats, forty-eight submarines, organised in five sections, besides scouts and parent ships.

The Fourth Division of the Home Fleet consists of five Canopus class and the Trafalgar based on the Nore, seven Royal Sovereigns and the Nile based on Devonport, and twelve first or second-class protected cruisers.

The Fourth Cruiser Squadron, which is not given in the table, consists of the first-class cruisers Leviathan, Berwick, Donegal and Essex, and the third-class cruisers Brilliant, Melpomene and Scylla.

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	GREAT BRITAIN.				GERMANY.	FRANCE.	
			Home Fleet.				
Class.	Mediterranean.	Atlantic Fleet.	1st Division.	2nd Division.	High Sea Fleet.	1st Squadron.	2nd Squadron.
Battleships	Cornwallis Duncan Exmouth Russell Swiftsure Triumph	Queen Prince of Wales Formidable Implacable Venerable London	Dreadnought Bellerophon Superb Temeraire St. Vincent Vanguard Agamemnon Lord Nelson	Edward VII. Africa Britannia Commonwealth Dominion Hibernia Hindustan New Zealand	1st Squadron. Nassau Westfalen Hannover Schlesien Mecklenburg Zähringen Wittelsbach Wettin 2nd Squadron. Schleswig Holstein Elsass Hessen Preussen Lothringen Deutschland Pommern Braunschweig	1st Division. Patrie République Démocratie 2nd Division. Justice Liberté Vérité Suffren Henry IV.* (Bizerta) Jules Ferry Victor Hugo Jules Michelet Ernest Renan Léon Gambetta	1st Division. Charlemagne Gaulois St. Louis 2nd Division. Bouvet Carnot Jauréguiberry Charles Martel Gueydon Dupetit-Thouars Marseillaise Gloire Condé
Cruisers 1st Class	6th Squadron. Bacchante Aboukir Lancaster Suffolk	5th Squadron. Drake Black Prince D. of Edinburgh Argyll	1st Cruiser Squadron. Indomitable Inflexible Invincible Defence	2nd Cruiser Squadron. Shannon Achilles Cochrane Natal Warrior	Blucher Gneisenau Roon Yorck		
Cruisers 2nd Class	Diana Minerva	Doris Venus	Dido Isis	Juno Talbot	..	Chateaurenault* (Toulon)	..
Cruisers 3rd Class	Barham Medea	Amethyst	Boadicea	Bellona	6	Du Chayla† Cosmao† Friant† Forbin†	Cassard*
Destroyers	11	..	24	24*	11	12‡	12
Attached to Destroyers	..	..	Blake 2 Scouts	Blenheim 2 Scouts	..	..	..

* Not included in the Squadrons. † In Morocco. ‡ Besides 32 at various ports.

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The cadet-training cruisers Cornwall and Cumberland are attached to this squadron.

Germany. The German High Sea Fleet comprises sixteen battleships, as last year. Two of the Nassau class, the Nassau and Westfalen, have been commissioned. The Rheinland and Posen are practically ready for sea and will be added to the Fleet in the summer or autumn. The last two of the Kaiser class have now been transferred to the Reserve Squadron, which has been much strengthened, and now comprises four Kaiser class and four Wörth class.

France. An important change has taken place in the organisation of the French Fleet in commission. The Fleet in European waters has been organised in two Squadrons under one Commander-in-Chief. The Active Squadron of the Mediterranean Fleet, which consists of the six Patrie class, with the Suffren in reserve, forms the First Squadron, with its base at Toulon. The Reserve Squadron, consisting of the Charlemagne class (three), the Bouvet, Carnot and Jauréguiberry, with the Charles Martel as reserve ship, constitutes the Second Squadron. Though this Squadron is temporarily transferred to Brest, it is apparently not intended to confine either squadron to the Mediterranean or to Northern waters. Five armoured cruisers (one being in reserve) are attached to each squadron.

Italy. The Italian Fleet is now organised in three divisions as follows:—

First Division:—Two battleships, Regina Margherita and Benedetto Brin; two armoured cruisers, Amalfi and Pisa; and four destroyers.

Second or Flying Division:—Four battleships, Regina Elena, Vittorio Emanuele, Roma and Napoli. These are all of the same class.

Third Division (in reserve):—Four armoured cruisers, G. Garibaldi, Varese, Ferrucio and Carlo Alberto; and two gunboats.

Six submarines are in commission at Venice.

Russia. The Russians have in commission in the Baltic two battleships, Slava and Cesarevitch, three armoured cruisers, Adm. Makaroff, Rossia and Rurik, a training squadron comprising the three protected cruisers Aurora, Bogatyr and Diana, besides destroyers, torpedo boats and submarines; and in the Black Sea three battleships, Rostislav, Panteleimon and Joann Zlatoust (not yet completed), and one protected cruiser, Kagul. The protected cruiser Oleg is in commission in the Mediterranean.

Austria. The Austrians have, as last year, in full commission three battleships of the Erzherzog class, and in reserve three battleships of the Arpad type.

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Ships in commission. Europe.

The following table gives the number of battleships in commission for the British, German and French Navies for 1899 and certain subsequent years. The re-organisation of the French Fleet has already been explained. We have thirty-nine battleships in full commission or in commission with nucleus crews, or two more than last year, the Germans have twenty-four. The fourteen battleships of the Fourth Division Home Fleet are not included in the British total. The Henri IV. is not included in that of France.

Year.	GREAT BRITAIN.					GERMANY.		FRANCE.			
	Mediterranean.	Atlantic.	Home.	Channel.	Total.	Battle Fleet.	Reserve.	Northern Squadron.	Mediterranean. Active.	Mediterranean. Reserve.	Total.
1899	11	8	—	10	29	7	—	6	6	9	21
1903	14	6	—	10	30	8	—	5	6	3	14
1906	8	8	13	16	45	15	8†	6	6	3	15
1908	6	6	12*	14	38	16	3§	—	6	6	12
1909	6	6	16	8‡	36	16	3§	—	6	6	12
1910	6	6	16	11‡	39	16	8	—	12	2	14

* Six in full commission. † Includes eight coast-defence ships.
‡ Third Division Home Fleet. § Includes two coast-defence ships.

Eastern waters.

The Japanese have in commission three battleships, Katori, Shikishima and Iwami, four armoured cruisers, and four protected cruisers.

The following is a list of the Squadrons kept in commission by the principal Naval Powers in Eastern waters:—

	Britain.	*Germany.*	*France.*	*United States.*
CRUISERS (1st Class)	Minotaur Bedford. Monmouth. Kent. Powerful (A.)	Scharnhorst	Montcalm	Charleston.
CRUISERS (2nd Class)	Hyacinth (E.I.) Challenger (A.) Encounter (A.)			
CRUISERS (3rd Class)	Astraea. Flora. Fox (E.I.) Cambrian (A.) Perseus (E.I.) Proserpine (E.I.) Pegasus (A.) Pioneer (A.) Prometheus (A.) Psyche (A.) Pyramus (A.) Philomel (E.I.)	Arcona. Leipzig. Condor (A.) Cormoran (A.)	Alger.	Albany. Cincinnati. New Orleans. Raleigh.

A. = Australia. E.I. = East Indies. P. = Pacific.

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The United States Pacific Fleet consists of the following armoured cruisers :—

1st Squadron.

1st Division.	2nd Division.
West Virginia.	Tennessee.
Colorado.	California.
Maryland.	South Dakota.
Pennsylvania.	Washington.

Two first-class cruisers, the Milwaukee and St. Louis, are in commission with nucleus crews. Two Monitors, the Monadnock and the Monterey, are in reserve. Several gunboats and four destroyers are in commission in the Philippine Islands.

North Atlantic.

The United States have sixteen battleships and three armoured cruisers in commission in the Atlantic Fleet.

We have only three third-class cruisers on the East Coast of North America and in the West Indies. They are attached to the Fourth Cruiser Squadron.

Cape.

On the Cape Station there are only one second-class and two third-class cruisers. The Cape of Good Hope is an important strategic point and may in certain eventualities become one of the most vital strategic points in the British Empire. A first-class dockyard has been established at Simon's Bay. This station extends as far north as Kisamayu, on the east coast, and on the west coast the nearest British ships are in the Mediterranean. The value of the homeward shipments in gold and diamonds is not far short of £1,000,000 every week. The squadron at this station has been unduly reduced considering the enormous interests involved. It should be strengthened by one first-class cruiser.

Comparative tables.

Some change has been made in the tables of battleships. Table I. now includes only those battleships which are in full commission, or types of which are in full commission, and which may therefore be considered fit for the first line. The Bouvet and Masséna, like the Charlemagne class, Carnot, etc., have been relegated to Table II., for although still in commission in the Second Division of the French Battle Fleet, they were all launched in 1896 or earlier, and are certainly not superior in power to the battleships now kept in reserve by the British, German and United States Navies. The principle of division above indicated relegates fifteen British ships (viz., six Canopus class and nine Majestic class), five United States ships (viz., Wisconsin, two Alabama class and two Kearsage class), five German ships (Kaiser class now in reserve), three Japanese ships (viz., two Suo class and Fuji), to Table II. From Table II. there have been removed five British ships (viz., the Barfleur and Centurion, which have gone to the Mother Bank, the Renown, which has never

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had her 6-in. guns remounted, and the Nile and Trafalgar), the Japanese Iki, and the Russian Dvenadzat Apostoloff. The French Brennus and the three Italian battleships of the Sardegna class can hardly be considered effective.

The present position as regards battleships of all classes is shown in the following table :—

	Britain.	United States.	Germany.	France.	Japan.	Russia.	Italy.
Built . .	55	29	26	17	12	6	11
Building .	7	4	11	6	3	8	1
Total .	62	33	37	23	15	14	12

The chief significance of the above figures is that Germany, owing to the fact that she has under construction more battleships than Britain or the United States, must improve her relative position in the immediate future unless increased exertions are put forth by ourselves and others. Of completed battleships of all classes we have fifty-five to fifty-five for Germany and the United States.

Modern battleships. Forecast.

Taking modern battleships (viz, those enumerated in Table I.) only, we have thirty-two ships completed to thirty-seven, or including ships under construction thirty-nine ships to fifty-two for Germany and the United States. It is evident that our naval position must deteriorate in the immediate future, for the five large armoured ships of the 1910–11 programme are not to be laid down till 1911, and will not be completed till 1913. This is made clear by the following forecast of the strength of the leading navies of the world in modern battleships at the end of 1910, 1911, and 1912 :—

	Britain.	United States.	Germany.	France.	Japan.
1910 (end) .	33	20	19	10	9
1911 (to be completed)	3	2	3	2	—
1911 (end) .	36	22	22	12	9
1912 (to be completed)	3	2	3	1	2
1912 (end) .	39	24	25	13	11

In 1910 Germany and the United States have an advantage of six ships over Britain; in 1911 this will be increased to eight, and in 1912 to ten ships.

All-big-gun ships.

In the animated discussion which took place last year both in Parliament and the Press, the comparison of naval strength was mainly confined to so-called Dreadnoughts, or all-big-gun ships. It is true that in the most recent designs for every foreign navy—except the French—the main armament consists exclusively of guns of

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11-in., 12-in., or 13·5-in. calibre, and that the 10-in. or 9·2-in. guns of the Aki, the Imperator Paul, and Lord Nelson have disappeared. To this extent, and to this extent only, the Nassau, the Florida, or the Settsu may be considered copies of the Dreadnought. On the other hand the Dreadnought and her British successors constitute a class by themselves, in that no other Power (except the United States in the Michigan) has copied the entire abandonment of the secondary armament. The Nassau class carry 12 6-in. guns, the Florida class and the Arkansas carry 12 to 16 5-in. guns, the Japanese Settsu 12 6-in. guns, in an armoured main-deck battery or in casemates. These powerful secondary batteries may tell heavily in an engagement.

The figures, as regards Dreadnoughts and ships launched in 1906 or subsequently, which may be considered fit to "lie in a line" with them, and which are grouped above the space in Table I., are as follows:—

	Britain.	United States.	Germany.	France.	Japan.	Russia.	Italy.
Built . .	9	4	2	—	1	—	—
Building .	7	4	11	6	3	6	1
Total .	16	8	13	6	4	6	1

Our margin over Germany in this class (which it is claimed in certain quarters has rendered obsolete all older battleships) is small.

Cruiser battleships.

Three cruiser battleships (Indomitables) are completed and three building for the British Navy, in addition to the two ordered on behalf of New Zealand and Australia. One cruiser-battleship should be completed this summer, and three others are building for the German Navy.

Cruisers.

There is little change in the cruiser lists. Except the cruiser battleships just mentioned, no armoured cruiser has been laid down during the past year. One armoured cruiser each has been completed for the French, Japanese, and Italian Navies. The Diadem class (eight ships), though protected cruisers, are better classified with the first-class cruisers than with the second-class cruisers, which they so greatly exceed in size. They will probably drop out of the lists ere long as they are costly ships to man and maintain.

Second-class cruisers.

Four Bristols have been laid down during the year for the British Navy. The five original vessels of this class have been launched. They are superior in speed to any cruiser of the second class, and in fighting power to the numerous German third-class cruisers., but the armament (two 6-in. and ten 4-in.) is poor for vessels of nearly 5000 tons. The vessels laid down in 1909 will carry eight 6-in. guns, a great improvement. Medium-sized cruisers for the protection of commerce were much needed to replace the Naval Defence Act and other cruisers which have been so freely "scrapped" or converted

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for subsidiary purposes (as mine-layers, etc.) in recent years. Five protected cruisers are to be laid down in 1910-11. No other Power except Japan, appears to contemplate building cruisers of this class.

Third-class cruisers.

For both the British and German Navies two third-class cruisers have been completed and two laid down. With these exceptions no small cruisers are under construction. Many of the French small cruisers will shortly be struck off the list. Most of the Italian third-class cruisers are equally ineffective.

In the cruiser classes our position is not unsatisfactory, and owing to the practical cessation of cruiser construction in most foreign countries it will more probably improve than deteriorate.

Comparative expenditure.

The tables of comparative naval expenditure show a large increase (over £4,000,000) for Great Britain, a considerable increase for Germany (£1,650,000), a reduction (£1,560,000) for the United States, and small increases for France, Russia, Japan and Italy. British expenditure in new construction is increased by over £2,500,000, and exceeds that for Germany by £1,360,000. Germany, as pointed out last year, is able to devote to new construction more than half her total naval expenditure.

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Comparative Tables of British, German, United States, French, Japanese, Russian, and Italian Ships.

TABLE I.—BATTLESHIPS.

GREAT BRITAIN.

Launched.	Name.	Displacement.
		tons.
	Conqueror ...	22,500
	Monarch	
	Thunderer ...	
	Orion	
	Colossus	20,000
	Hercules	
1909	*Neptune*	
1908	Collingwood ...	19,250
1908	St. Vincent ...	
1909	Vanguard ...	
1907	Bellerophon ...	18,600
1907	Temeraire ...	
1907	Superb	
1906	Dreadnought ..	17,900
1906	Lord Nelson ...	16,500
1906	Agamemnon ...	
1903	Edward VII. ...	16,350
1903	Commonwealth	
1903	Dominion ...	
1903	Hindustan ...	
1904	New Zealand ...	
1905	Africa	
1904	Britannia	
1905	Hibernia	
1903	Swiftsure	11,800
1903	Triumph	
1902	Queen	15,000
1902	Prince of Wales	
1901	Albemarle ...	14,000
1901	Cornwallis ...	
1901	Duncan	
1901	Exmouth	
1901	Russell	
1898	Formidable ...	15,000
1898	Irresistible ...	
1899	Implacable ...	
1899	London	
1899	Venerable ...	
1899	Bulwark	
	39 ships.*	658,850

UNITED STATES.

Launched.	Name.	Displacement.
		tons.
	Wyoming	26,000
	Arkansas	
	Florida	21,825
1909	*Utah*	
1909	Delaware	20,000
1908	North Dakota ...	
1908	Michigan	16,000
1908	South Carolina	
1905	Idaho	13,000
1905	Mississippi ...	
1904	Connecticut ...	16,000
1905	Kansas	
1904	Louisiana	
1905	Minnesota ...	
1906	New Hampshire	
1905	Vermont	
1904	Georgia	14,948
1904	Nebraska	
1904	New Jersey ...	
1904	Rhode Island ...	
1904	Virginia	
1901	Ohio	12,440
1901	Maine	12,300
1901	Missouri	
	24 ships.†	401,430

GERMANY.

Launched.	Name.	Displacement.
		tons.
	Ers Aegir	‡ 22,000
	Ers Hagen ..	
	Ers. Odin ...	
	Ers Frithjof ...	
	Ers Heimdall ...	
	Ers Hildebrand	
1909	*Thuringen* ...	
1909	*Ostfriesland* ...	
1909	*Helgoland* ...	
1908	*Posen*	18,200
1908	*Rheinland* ...	
1908	Nassau	
1908	Westfalen ...	
1904	Deutschland ...	13,040
1905	Hannover ...	
1905	Pommern	
1906	Schlesien	
1906	Schleswig-Holstein	
1902	Braunschweig ...	12,997
1903	Elsass	
1903	Hessen	
1903	Preussen	
1904	Loth ingen ...	
1900	Wittelsbach ...	11,643
1901	Wettin	
1901	Zähringen ...	
1901	Mecklenburg ...	
1901	Schwaben	
	28 ships.	459,200

FRANCE.

Launched.	Name.	Displacement.
		tons.
1909	*Danton*	17,710
1909	*Condorcet* ...	
1909	*Inderot*	
1909	*Mirabeau* ...	
1910	*Vergniaud* ...	
1909	*Voltaire*	
1903	Patrie	14,635
1902	République ...	
1905	Liberte	
1904	Justice	
1907	Vérité	
1904	Démocratie ...	
1899	Suffren	12,527
	13 ships.	206,597

JAPAN.

Launched.	Name.	Displacement.
		tons.
	Kawachi	20,800
	Settsu	
1907	*Aki*	19,800
1906	Satsuma	19,350
1905	Kashima	16,400
1905	Katori	15,950
1902	Iwami	13,516
1900	Hizen	12,700
1899	Asahi	15,200
1900	Mikasa	
1898	Shikishima ...	14,850
	11 ships.¶	184,566

RUSSIA.

Launched.	Name.	Displacement.
		tons.
	Sevastopol ...	‡ 23,000
	Petropavlosk ...	
	Gangut	
	Poltava	
1907	*Imperator Pavel I.*	17,200
1906	*Andrei Pervozvannyi* ...	
1906	*Ioann Zlatoust*	12,733
1906	*Evstafi*	
1903	Slava	13,516
1901	Cesarevitch ...	12,912
1900	Panteleimon ...	12,480
	7 ships.	190,771

ITALY.

Launched.	Name.	Displacement.
		tons.
	Dante Alighieri	21,500
1904	Regina Elena ...	12,425
1904	Emanuele III. .	
1907	Roma	
1905	Napoli	
1901	Re Margherita	13,214
1901	Benedetto Brin	
	7 ships.**	97,628

* Four projected. † Two projected. ‡ Doubtful. ¶ 1 Projected. ** Two projected.

TABLE II.—OLDER BATTLESHIPS.

GREAT BRITAIN.			UNITED STATES.			GERMANY.			FRANCE.			JAPAN.			RUSSIA.			ITALY.		
Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.
		tons.			tons.			tons.			tons.			tons.			tons.			tons.
1897	Canopus	12,950	1898	Wisconsin	11,653	1896	Kaiser Friedrich III.	10,974	1896	Bouvet	12,007	1898	Sagami	12,674	1893	Tria Sviatitelia	13,318	1897	E. Filiberto	9,645
1899	Glory		1898	Alabama					1895	Masséna	11,735	1900	Suo		1892	Georgi Pobiedonosets	10,280	1897	Saint Bon	
1898	Albion		1898	Illinois	11,565	1897	Kaiser Wilhelm II		1896	St. Louis	11,090	1896	Fuji	12,320				1888	Re Umberto	13,673
1898	Goliath		1898	Kearsarge					1896	Gaulois	11,105	1894	Tango	10,960	1896	Rostislav	8,880	1890	Sardegna	13,640
1898	Ocean		1898	Kentucky	11,540	1899	Kaiser Wilhelm der Grosse		1895	Charlemagne	11,108							1891	Sicilia	13,087
1899	Vengeance		1896	Iowa	11,340				1893	Jauréguiberry	11,637									
1894	Magnificent	14,900	1893	Indiana	10,288	1900	Kaiser Barbarossa		1893	Charles Martel	11,693									
1895	Majestic		1893	Massachusetts					1894	Carnot	11,954									
1895	Prince George		1893	Oregon		1899	Kaiser Karl der Grosse		1891	Brennus	11,190									
1895	Victorious								1899	Henri IV.	8,807									
1896	Cæsar					1891	Brandenburg	9,874												
1896	Hannibal					1891	Kurfürst Friedrich Wilhelm													
1896	Illustrious					1891	Weissenburg													
1895	Jupiter					1892	Wörth													
1896	Mars																			
1891	Royal Sovereign	14,150																		
1891	E. of India																			
1891	Hood																			
1892	Ramillies																			
1892	Repulse																			
1892	Resolution																			
1892	Revenge*																			
1892	Royal Oak																			
	23 ships.	325,000		9 ships.	100,067		9 ships.	94,366		10 ships.	112,326		4 ships.	48,628		3 ships.	42,758		5 ships.	59,690

* Doubtful if effective.

TABLE III.—FIRST-CLASS CRUISERS.

GREAT BRITAIN.			UNITED STATES.			GERMANY.			FRANCE.			JAPAN.			RUSSIA.			ITALY.		
Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.
kts.		tons.	kts.		tons.	kts.		tons.	kts		tons.	kts.		tons.	kts.		tons.	kts.		tons.
—	*Princess Royal*		22	Washington ...		—	*I*		23	*Edgard Quinet*		21	Ikoma		21	Rurik	15,170	22½	Amalfi	
28	*Lion*	26,350	22	Tennessee ...	14,500	27	*II*†	21,500	23	*Waldeck-Rousseau* ...	13,780	21	Tsukuba	13,750	22	Adm. Makaroff		22½	Pisa	9,832
26	*Indefatigable* ...	18 750	22	Montana		25	*Moltke*	19,000				22	Ibuki		21	*Bayan*	7,900	22½	*San Giorgio* ...	
25	Invincible ...		22	North Carolina		25	*Von der Tann*†		23	Ernest Renan...	13,427	22	*Kurama*	14,620	21	*Pallada*		22½	*San Marco* ...	
25	Inflexible... ...	17,250	22	St. Louis					23	Jules Michelet	12,370	21	Aso	7,726	20	Gromoboi	12,336			
25	Indomitable ...		22	Charleston ..	9,700	23	Blucher	15,253	22	Léon Gambetta		20	Kasuga	7,700	20	Rossia	12,130	20	Giuseppe Garibaldi	7,294
22½	Minotaur... ..		22	Milwaukee ...		22½	Scharnhorst ...	11,420	22	Jules Ferry ...	12,351	20	Nisshin					20	Varese	
22½	Shannon	14,600	22	West Virginia		22½	Gneisenau ...		22	Victor Hugo ...		21	Idzumo	9,750				20	F. Ferruccio ...	
22½	Defence		22	California ...		21	Roon...	9,350	21	Condé		21	Iwate							
23	Duke of Edinburgh		22	Colorado	13,680	21	Yorck		21	Gloire	9,856	20	Yakumo	9,850						
			22	Maryland... ...		20½	Prinz Adalbert	8,858	21	Marseillaise ...		21	Adzuma	9,436						
23	Black Prince ...	13,550	22	Pennsylvania ...		20½	Friedrich Karl...		21	Amiral Aube ...		21½	Asama	9,700						
23	Achilles		22	South Dakota ...		20½	Prinz Heinrich	8,759	21	Gueydon		21½	Tokiwa							
23	Cochrane		21	New York ...	8,200	19	Fürst Bismarck	10,570	21	Montcalm ..	9,367									
23	Natal		21	Brooklyn	9,215				21	Dupetit Thouars										
23	Warrior								21	Jeanne d'Arc ...	11,092									
22½	Devonshire ...																			
22½	Antrim																			
22½	Argyll																			
22½	Carnarvon ...	10,850																		
22½	Hampshire ...																			
22½	Roxburgh ...																			
23	Monmouth ...																			
23	Kent																			
23	Bedford																			
23	Essex																			
23	Berwick	9,800																		
23	Cornwall																			
23	Cumberland ...																			
23	Donegal																			
23	Lancaster ...																			
23	Suffolk																			
23	Drake																			
23	Good Hope ...	14,100																		
23	King Alfred ...																			
23	Leviathan ...																			
21	Aboukir																			
21	Bacchante ...																			
21	Cressy	12,000																		
21	Euryalus																			
21	Hogue																			
21	Sutlej																			
20½	Amphitrite* ...																			
20½	Argonaut* ...	11,000																		
20½	Ariadne*																			
20½	Spartiate*... ...																			
20½	Andromeda* ...																			
20½	Diadem*	11,000																		
20½	Europa*																			
20½	Niobe*																			
22	Powerful*... ...	14,200																		
22	Terrible*																			
	51 ships.¶	629,850		15 ships.	186,595		13 ships.	152,845		15 ships.	169,027		13 ships.‡	138,052		6 ships.	63,336		7 ships.	61,210

* Protected Cruisers. † Particulars doubtful. ‡ Three projected. ¶ In addition to two large cruisers for Australia and New Zealand

TABLE IV.—SECOND-CLASS CRUISERS.

GREAT BRITAIN.			UNITED STATES.			GERMANY.			FRANCE.			JAPAN.			RUSSIA.			ITALY.		
Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.
kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.
25	*Dartmouth* ...	5,250	22·8	Columbia	7,375	21	Kaiserin Augusta	5,956	21	Desaix	7,578	22	Chitose	4,760	18	Pamyat Azova	6,734	20	Carlo Alberto ...	6,396
25	*Falmouth* ...		23	Minneapolis ...		19½	Freya	5,569	21	Dupleix		22	Kasagi	5,416	20	Aurora	6,731	20	Vettor Pisani ...	
25	*Weymouth* ...		21½	Olympia	5,870	19½	Hertha		21	Kléber		23	Soya	6,500	20	Diana	6,630	19	Marco Polo ...	4,511
25	*Yarmouth* ...					19½	Victoria Luise		20	Dupuy de Lôme	6,676	20	Tsugaru	6,630	23	Askold	5,905			
25	*Bristol*	4,800				19½	Hansa	5,791	19	D'Entrecasteaux	7,995				23	Bogatyr	6,645			
25	*Glasgow*					19½	Vineta		23	Guichen	8,151				23	Kagul				
25	*Gloucester* ...								23	Châteaurenault	7,898				23	Otchakoff... ...				
25	*Liverpool*								18	Bruix	4,735				23	Oleg	6,675			
25	*Newcastle* ...								18	Charner	4,702									
19½	Crescent	7,700							18	Latouche-Tréville	4,681									
20	Edgar	7,350							19	Pothuau	5,374									
20	Endymion ...	7,350							23	Jurien de la Gravière ...	5,595									
19½	Gibraltar	7,700																		
20	Grafton	7,350																		
20	Hawke	7,350																		
19½	Royal Arthur ...	7,700																		
20	Theseus	7,350																		
19½	Diana	5,600																		
19½	Dido																			
19½	Doris...																			
19½	Eclipse																			
19½	Isis																			
19½	Juno																			
19½	Minerva																			
19½	Talbot																			
19½	Venus																			
19	Arrogant	5,750																		
19	Furious																			
19	Vindictive ...																			
20	Hermes	5,600																		
20	Highflyer... ...																			
20	Hyacinth																			
21	Challenger ...	5,880																		
21	Encounter ...																			
	34 ships.*	201,060		3 ships.	20,620		6 ships.	34,245		12 ships.	78,541		4 ships.†	23,306		8 ships.	52,610		3 ships.	17,303

* Five projected.

† Two projected.

TABLE V.—THIRD-CLASS CRUISERS.

GREAT BRITAIN.			UNITED STATES.			GERMANY.			FRANCE.			JAPAN.			RUSSIA.			ITALY.		
Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.
kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.
25	*Blanche*	3,360	18½	Detroit	2,089		*Ersatz Bussard*	4,261	20	Davout*	3,031	23	Tone	4,035	19	Almaz	3,285	17	Vesuvio	3,373
25	*Blonde*		18½	Marblehead			*Ersatz Falke*		20	Linois*	2,308	20	Akashi	2,657	23	Jemtchug	3,106	18	Etna	3,470
25	Bellona		18½	Montgomery		27	*Augsburg*		20	Galilee*	2,318	20	Suma					17½	Fieramosca	3,534
25	Boadicea	3,300	20	Albany	3,487	27	*Köln*		20	Lavoisier	2,285	19	Akitsushima	3,150				17	Stromboli	3,836
23	Amethyst	3,000	20	New Orleans		25½	Kolberg	4,234	20½	D'Estrees	2,421	17	Chiyoda	2,450				21	Piemonte	2,597
22	Diamond		20	Baltimore	4,413	25½	Mainz		20½	Infernet*	2,435	17	Hashidate	4,277				17	Calabria	2,428
22	Sapphire		18	Chicago	5,273	24½	Emden	3,544	19	Alger	4,313	17	Itaukushima					18	Elba	2,690
22	Topaze		19	Newark	4,098	24½	Dresden		19	Isly*	4,406	18½	Naniwa	3,700				17½	Giovanni Bausan	3,277
19½	Astræa	4,360	19½	San Francisco		23½	Stuttgart	3,396	19½	Chasseloup-Laubat*	3,824	18½	Takachiho					19	Etruria	2,245
19½	Cambrian		19	Cincinnati	3,213	23½	Nürnberg		19½	Friant	3,882	20	Niitaka	3,365				18	Liguria	
19½	Charybdis		19	Raleigh		23½	Stettin		19½	Pascal*	3,951	20	Tsushima					18	Umbria	
19½	Flora		24	Birmingham	3,750	23	Königsberg	3,346	19	Descartes	3,970	20	Otawa	3,000				17	Lombardia	2,351
19½	Forte		24	Chester		23	Bremen		19	Cassard	3,890	25	Sutsuya	3,080				20	Puglia	2,498
19½	Fox		24	Salem		23	Hamburg		19	D'Assas*	3,962									
19½	Hermione					23	Berlin		19	Du Chayla	3,890									
19½	Æolus	3,600				23	München	3,200	19	Catinat*	4,048									
19½	Brilliant					23	Lübeck		19	Protet*	4,001									
19½	Iphigenia					23	Leipzig													
20	Latona					23	Danzig													
19½	Melpomene	3,400				21½	Frauenlob	2,657	20½	Cosmao	1,923									
20	Sappho					21½	Arcona		20½	Forbin	1,935									
20	Scylla					21½	Undine		20½	Lalande*	1,968									
19½	Sirius	3,600				21	Medusa	2,618	20½	Surcouf	2,012									
20	Terpsichore	3,400				21	Nymphe													
19	Philomel	2,575				21	Amazone													
20½	Pelorus	2,135				21	Ariadne													
20	Proserpine					21½	Thetis													
20	Pegasus					21	Gazelle	2,603												
20	Perseus					21	Niobe													
20	Prometheus					20	Gefion	3,712												
20	Pyramus					20	Irene	4,233												
20	Pandora	2,200				19	Prinzess Wilhelm													
20	Pioneer																			
20	Psyche																			
	34 ships.	109,485		14 ships.	48,799		32 ships.†	98,459		21 ships.	66,773		13 ships.	43,713		2 ships.	6,391		13 ships	36,789

* Probably to be condemned as ineffective.

† Two projected.

Effective Fighting Ships, Built and Building.

Class.	Great Britain.			United States.			Germany.			France.			Japan.			Russia.			Italy.		
	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.
Battleships:—																					
Modern ...	32	7	39	20	4	24	17	11	28	7	6	13	8	3	11	3	8	11	6	1	7
Older... ...	23	—	23	9	—	9	9	—	9	10	—	10	4	—	4	3	—	3	5	—	5
Total ...	55	7	62	29	4	33	26	11	37	17	6	23	12	3	15	6	8	14	11	1	12
Cruisers:—																					
1st Class ...	48	5*	53	15	—	15	9	4	13	13	2	15	12	1	13	4	2	6	5	2	7
2nd Class ...	25	9	34	3	—	3	6	—	6	12	—	12	4	—	4	8	—	8	3	—	3
3rd Class ...	32	2	34	14	—	14	28	4	32	21	—	21	13	—	13	2	—	2	13	—	13
Total ...	105	16	121	32	—	32	43	8	51	46	2	48	29	1	30	14	2	16	21	2	23

* Including two ordered for Australia and New Zealand.

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Torpedo Flotillas.

Class.	GREAT BRITAIN.			UNITED STATES.			GERMANY.			FRANCE.			JAPAN.			RUSSIA.			ITALY.		
	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.
Destroyers ..	150	36	186*	25	15	40	92	24	116	61	22	83	52	6	58	82	5	87	21	12‡	33
Torpedo Boats— 1st & 2nd Class	116	—	116	28	—	28	70	—	70	150	—	150	48	—	48	74	—	74	45	30‡	75
Submarine Boats	60	24	84	18	17	35	8	6*	14	60	28	88	9	5	14	33	4	37	7	12‡	19

* 23 projected.

‡ Projected 1909–12.

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Total Naval Expenditure.

—	Great Britain.	Germany.	United States.	France.	Japan.	Russia.	Italy.
	£	£	£	£	£	£	£
1901	30,981,315	9,530,333	16,012,438	13,107,701	—	9,359,766	4,912,661
1902	31,003,977	10,044,031	16,203,916	12,271,948	—	10,446,392	4,840,000
1903	35,709,477	10,401,174	16,824,058	12,538,861	—	12,349,567	4,840,000
1904	36,859,681	10,102,740	20,180,310	12,513,143	—	11,949,906	5,000,000
1905	33,151,841	11,301,370	24,444,948	12,747,963	—	12,392,684	5,040,000
1906	31,472,087	12,005,871	21,358,199	13,003,238	3,952,311	12,490,444	5,322,154
1907	31,419,500	13,623,924	21,260,732	12,486,793	8,248,222	8,850,240	5,661,822
1908	32,319,500	16,596,561	25,833,217	12,797,308	8,094,884	10,222,733	6,266,193
1909	35,142,700	19,594,566	28,138,261	13,353,824	7,202,823	*9,895,641	6,385,440
1910	40,603,700	21,247,588	26,515,468	13,659,820	7,608,081	10,219,766	6,950,987

* Net Estimate.

Amount Voted for New Construction.

The Actual Expenditure for Great Britain is shown in Italics.

	Great Britain.	Germany.	U. States.	France.	Japan.	Russia.	Italy.
	£	£	£	£	£	£	£
1901	10,420,256 (*10,341,780*)	4,921,036	5,219,357	4,990,987	...	3,063,139	1,088,921
1902	10,436,520 (*9,782,217*)	5,039,725	4,701,121	5,389,383	...	2,904,096	1,254,787
1903	11,473,030 (*12,399,133*)	4,929,110	5,327,367	5,722,760	...	3,268,755	1,183,338
1904	13,508,176 (*13,184,419*)	4,644,862	6,539,990	5,636,732	...	4,480,188	1,121,753
1905	11,291,002 (*11,368,744*)	4,968,738	11,374,876	5,739,230	...	4,576,370	1,714,556
1906	10,859,500 (*10,486,397*)	5,342,466	8,600,774	5,702,267	752,595	4,576,583	1,362,207
1907	9,227,000 (*9,166,876*)	6,285,225	6,783,705	5,132,494	3,233,298	2,846,268	1,398,111
1908	8,660,202	8,366,438	7,798,815	5,315,790	2,967,918	2,703,721	1,866,358
1909	10,256,194	10,751,468	10,015,101	5,760,176	2,494,381	1,822,237	2,190,707
1910	13,279,880	11,921,195	*6,222,100	5,918,292	...	...	2,662,406

* This is the figure given for the "Increase of the Navy" in the United States Estimates. It does not include certain items which increase the totals given for previous years in the Thomasson Return.

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CHAPTER IV.

Navy War Councils and General Staffs.

The "science of war."

Some interesting results might issue from an inquiry into the extent to which, in these days—according to the consecrated formula, "these scientific days"—we are influenced by the currency of words and phrases. The results would be specially interesting, significant and important when they touch the efficiency of the national defences. It is difficult to settle who was the real inventor of any mechanical appliance, and it is still more difficult to say definitely who first made some sonorous phrase or designation current. This is a pity, because we are thereby deprived of the pleasure of assigning pre-eminence in the realm of pedantry to the originator of the term Science of War. The term "Art of War" was good enough for the greatest masters of belligerency—for those who won victories first and talked about them, or were silent about them, afterwards. Similar obscurity hides the identity of the original promulgator of other collections of words which replenish the diction of present-day *Katheder-strategisten*. We must resign ourselves to the impossibility of deciding to whom belongs the honour of first asserting that invincibility in war depends on calling someone "Chief of the General Staff."

Effects of re-iteration.

It has to be admitted that assiduous reiteration of a form of words often secures for it general acceptance. Disproof of the accuracy of some well-known proverbs restricts their currency but little, and leaves almost unaffected their influence over popular opinion. The latter not infrequently acts upon the minds of those whose vocation it is to fashion and direct technical procedure. Once allow that the lecture-room term "Science of War" properly connotes the methods and operations of belligerency, and you find yourself involved in the fog of uncertainty which covers, as with a vesture, an inexact science. The professors thereof have an enormous advantage in disputation. Being bound by no really scientific rules or principles they can always fall back upon the elusive method. The technical expert, finding that his efforts at refutation of their assertions are futile, and that the "man in the street" has picked up and never tires of repeating their formulæ, is apt to think that there is something in their utterances, and occasionally permits them to govern his action. What is the best way of guarding against this?

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Necessary to ascertain origin.

First of all, let us set ourselves to ascertain where it was that the professors in question found their Abracadabra. We can then proceed to estimate to what extent an arrangement, useful in particular circumstances, retains its value when transplanted elsewhere. Finally, it will appear how acceptance of a magical formula encourages adoption of other arrangements which, in the opinion of loose thinkers, it is supposed to cover. Since the last volume of the *Naval Annual* was published, it has been announced that a standing Navy War Council has been instituted. The announcement was promptly interpreted by amateur strategists as a step preliminary to the creation of a "Naval War Staff." The latter appellation was sometimes varied to "General Staff," thereby disclosing the mental obsession of its sponsors and the quarter from which it came.

German Military General Staff.

The obsession originated in superficial observation and consequently imperfect knowledge of the military arrangements of Germany. In that empire there is a very important institution, called the Great General Staff. In addition to the necessities which all armies experience of having what is called a Staff, the constitutional conditions in the German Empire render some organisation of the sort indispensable. Most of the people who occupy themselves in recommending foreign arrangements for adoption in this country speak of the German army, whereas there is no German army, but a combination of the armies of several different states. There is no German Minister of War, and consequently no such German Ministry. There are, however, Prussian, Bavarian, Saxon, and Württemberg Ministries of War. The land force of each kingdom still retains some independence, which in the case of Bavaria is considerable. The Bavarian army corps, for instance, are numbered independently, and are not included in the numerical succession embracing the other corps. The officers and men of each kingdom, or grand duchy, wear its particular colours as a cockade, an indication of the more or less independent status of the body to which they belong. It is obvious that some arrangement for maintaining unity of aim and procedure in a force so constituted must be found; and found it has been in that staff organisation which no army can be without. Had the work of preparing plans of operations been assigned to a ministry of war, it would have been possible, or indeed very likely, that the Berlin Ministry would have devised one plan and the Munich Ministry a different one. The existence of the Great General Staff removes this far from improbable difficulty. Of course, it does more than this; but amongst its many merits it has none higher than that of co-ordinating the several elements that make up the military strength of the Empire. This is a happy solution of what was undoubtedly a

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perplexing problem presented by the constitutional conditions of a federal state. So indispensable to a land force is a general staff that each federated kingdom has one of its own, members of which either continuously occupy positions in the greater body in Berlin or are in special cases attached to it.

German military and naval systems.

The contrast between the military arrangements and the naval arrangements of Germany is most instructive. As regards the former, to ensure suitable co-ordination of the federal elements, something parallel to a telephone exchange or clearing-house was required, and this—as has been seen—was supplied by the Berlin Great General Staff. In the case of the Navy, the fundamental conditions are dissimilar. It is in no sense a combination of federal sections, but is general or imperial. It is specially declared by the Constitution of the Empire that the Navy is uniform and indivisible (*einheitliche*). The officers and men wear the German tri-coloured and not a particularist cockade. The Emperor is Commander-in-Chief; and the King of Bavaria or the King of Saxony, as such, has no more authority over any part of the Navy than the Prince of Reuss-Greiz or the Prince of Schaumburg-Lippe. There is a German or Imperial Ministry of Marine and no other. Again, there is something full of interest and instruction in the way in which the Germans fashioned the direction of their Navy as soon as it began to assume considerable dimensions. Notwithstanding their naval youth and inexperience, they saw—what was hidden from the wise and prudent in England—that Sir James Graham's practical absorption of the Navy Board by the Board of Admiralty was a mistake to be characterised by their favourite adjective—colossal. Their inexperience, however, prevented them from seeing more than the mere fact. They did not perceive the right way of correcting the mistake. They established distinct administrative and executive departments, viz., the Imperial Navy Office or Ministry of Marine, and an executive authority or department of command called the Admiral-Staff. This sound arrangement was neutralised by the way in which the duties were distributed. The Ministry, which was to deal with supply and material, was made the more prominent and, naturally in the public eye, the more important department. The real directing authority—under the Emperor's supreme command—of the Navy as a fighting force was given a position to which an aspect of inferiority was inevitably imparted. This curious inversion of rational procedure could have happened only in the latter part of the nineteenth century, when the development of mechanical ingenuity and the ever-augmenting costliness of mere material appliances had reached the stage at which they exercised a commanding influence on men's minds.

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To this influence may be attributed the momentous phenomenon to be observed in present-day naval administration. The relatively humble functions of providing material and equipment for a war navy are not only made to seem superior to the strategic direction, handling, training, discipline, and maintenance generally of the efficiency of the force, they also go a long way towards crowding these super-eminently important matters out of recognition. From Washington to Pola—such is the fashion of the day—the chief naval authorities, for every minute that they can devote to the war-making efficiency of the Navy, which has crews as well as ships, must devote at least two minutes to the consideration of its material components. What in a body meant to engage in war when inevitable should be the highest function, viz., command and strategical direction, is—so we are told every day—just now regarded as quite secondary. This is why the Press teems with demands for War Councils and General Naval Staffs. These are only pompous names for little companies of subordinates charged with the performance of work which is properly that of the supreme authority, but which that supreme authority cannot perform, because its time is so much taken up with attempts to solve intricate problems of naval material, for the solution of which special professions have long existed.

Reason of demands for naval staffs.

Complete ignorance of constitutional conditions in Germany, and at best only superficial acquaintance with the naval and military arrangements of that Empire, explain much of the frequency and vehemence of the demands for the establishment in this country of a Naval General Staff. These demands to some extent also spring from an imperfect comprehension of the fundamental difference between an army and a navy. An army is so constituted that it must have some organisation to secure co-ordination of its various elements. To begin with, it is composed of several distinct arms. The tendency of its various branches is towards independence. For example, the medical and paying *personnel*—once incorporated in the many regiments—has within living memory been turned into two considerable and almost independent corps. A General Staff keeps such a force together, gives unity of direction to its efforts, and converts what without it would have been anarchy into coherent efficiency. The most triumphant instance of what such a body can do is exhibited by the Berlin Great General Staff, so often mentioned already. This grew out of the Prussian General Staff, itself suggested by Wellington's Peninsular Staff. The readiness and thoroughness with which this great institution picked up and wove into a strong and coherent fabric the previously discordant forces of a federated state, have proved to demonstration that the principles underlying its

Fundamental difference from conditions in an army.

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organisation were perfectly sound. Those who urge us to copy it here have been so dazzled by its unquestionable brilliancy that they have not been able to see that the intrinsic difference between army conditions and navy conditions renders it an unsuitable model for imitation in naval arrangements. A French writer has recently observed of those who advocate the adoption of the copy, that they have "les yeux tournés vers l'Allemagne et l'état Major Général allemand organisé de la même manière qu'il s'agisse de la Guerre ou de la Marine." It is all the same to them whether it be the Ministry of War or the Ministry of Marine that is concerned. This shows the fundamental error of the demand.

Conditions due to constitution of a navy.

The truth is that a navy is so constituted that it contains its General Staff in itself, and consequently does not need an excrescent body to co-ordinate its elements and their efforts. There must, of course, be a few assistants to save the chiefs from the work of dealing with details; but those assistants do not, and need not, compose a body to which so sounding a designation as General or Naval War Staff could be properly applied. The case of an army is altogether different. If the General Commanding-in-Chief at Aldershot received orders to despatch a suitably composed force of, say, 2000 men to a particular destination, it would be necessary to gather together members of different arms of the Service, to provide for their being accompanied by the due proportion of persons and material attached to several departments, to see to their transport, and to arrange for their supply. This would involve the necessity of setting in motion a variety of elements quite independent of each other. It will be seen at once that to effect the above some such organisation as a Staff is absolutely necessary. Compare with this the case of a Navy. Suppose that the Commander-in-Chief of the Home Fleet, when cruising, receives orders by wireless telegraph to despatch immediately, say, a couple of battleships to the Mediterranean. He need only signal to H.M. Ship X and H.M. Ship Y: "Proceed to the Mediterranean, calling at Gibraltar, and place yourself under the orders of the Commander-in-Chief of the Mediterranean Station." There must be many officers who have seen something like this actually done; and it is quite certain that it never occurred to one of them to consider that the intervention of a Staff was necessary, or even to think of one. The fact is that each ship concerned had on board all that a Staff would be required to put in action and also all the essential components of a Staff itself. This condition may be pursued either up or down, and it will be found to exist when either a large force or a small force has to be dealt with. From the St. Vincent to the Cadmus, every man-of-war—no matter to what class

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she belongs—is self-contained, and therefore no General Staff is needed to evoke her full belligerent efficiency.

Objections to unnecessary departments.

In such circumstances it is apparent that a distinct body like a Naval General Staff is not required. It is one of the innate characteristics of the public service, whether of the military or of the civilian order, that the establishment of an unnecessary branch or department has the inevitable result of making its members invent work, if there is none really waiting for them to do. This is forced upon them by the mere fact of establishing them, because no one, and least of all a newly-appointed government official, can be got to admit, or perhaps even to see, that neither he nor his activity is wanted. Unnecessary work and mischievous work are, in effect, convertible terms. The addition of a fifth wheel to the mechanism of the administrative coach does not assist, but, on the contrary, impedes progress. The only people who are benefited by it are the paper-makers, the printers of ruled "forms," and the ink-sellers. It may also lead to an increased demand for waste-paper baskets. Only a great humorist could paint in the right colours the curious modern superstition that the efficiency of a navy is directly proportionate to the number and intricacy of the tabular statements and periodical reports which its officers are compelled to fill up and send in.

Dangers likely to result.

There is unfortunately little hope of convincing those who have succumbed to the General Staff obsession that they are on the wrong tack. Attempts to adapt it to naval conditions here would be about as hopeful as attempts to acclimatise bananas on the summit of Ben Nevis. People who of themselves cannot see this will not be made to see it by any power on earth. There are, however, other people who do not necessarily attach magical influence to a mere form of words or a mere collection of syllables. They know that, no matter what a thing is called, it is likely to be useless, or worse, when out of place. They can understand how mischievous an institution can become when those who belong to it will have little to occupy them except trying to discover methods of making work. They will also know the propensity of officials so circumstanced to form themselves into a class apart, thanking heaven and the new system that they are not as other men are—nor even as those sea-going officers. This will fix a gulf between the Staff and the Service afloat that will grow wider at each step from the point of origin. Like everyone else the staff officer will expect advancement, and it will be surprising if he does not display great ingenuity in devising means for obtaining it. Is this to depend upon staff service or upon service at sea? Precedents drawn from the practice of armies will not help in the least

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any who wish to find an answer to that question. A navy has a peculiar characteristic which is essential to it and which is inherent in no other vocation. To be efficient its officers and men must be masters of two quite distinct professions, viz., that of the sea and that of arms. The procedure in Germany, even on its naval side, offers an example to be avoided rather than imitated. The arrangement, in accordance with which the command and strategic direction of the Navy—the *Admiral-Stab*—were made a sort of "sideshow" of the far more prominent Imperial Ministry of Marine—*Reichs-Marine-Amt*—was, to speak plainly, the work of inexperienced bunglers. Yet what we are asked by amateur strategists to do is to introduce a bungling imitation of what is in itself a bungle.

Strange belief as to need of advice for Admiralty.

Of all the comments that were made on the proposal to establish a Navy War Council none was more remarkable than that which declared that it would "strengthen" the Admiralty. This indicated a conception of the chief business of an Admiralty which merits serious attention. The proposed body, it was stated, was to be a "war council of advice." Therefore, it was evidently believed that some institution was needed to give advice on the very work which the Admiralty was always meant to perform, and which, as a matter of historical fact, it had performed with unsurpassed—indeed, unequalled—efficiency throughout more than a century of great wars. This was similar to a belief that the Judges of the High Court of Justice need a council to give them advice on the law of England. The latter belief would have, at any rate, apparent justification if the Judges had been expected to devote most of their time to considering the material of which their courts were built; the shape, depth, and direction of the drains; the designs of street elevations of court buildings; and the supply of curtains, door-mats, brooms, and scrubbing-brushes. The wishes of the Judges on details of the kind ought to be respected; but their lordships will leave these matters to be dealt with by the technical expert, whilst they themselves will find ample occupation in their proper business of expounding and administering the law. If, in discharge of this, they had to be "strengthened" or to be kept straight by a "council of advice," it would be nearly certain to occasion surprise. The surprise would be greater if it should appear that the Judges of the High Court could not give a decision on a case of importance until the Readers of the Council of Legal Education had instructed them thereon.

Due to ignorance of Admiralty history.

Yet it is much this kind of thing which the authors of published comments on the proposed setting up of a Navy War Council and a Naval General or War Staff believe ought to be accepted. What then can make them suppose that the supreme authority of a navy

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cannot be expected to discharge its first and most important duty unless it is "strengthened" by, and receives the "advice" of, a Council, behind which somewhere in the background stands a "War School"? As preliminary to the answer to this question, it must be said that such a supposition would have been inconceivable during the course of the great naval wars of the eighteenth and early nineteenth centuries. There is nothing in the history of armed forces, either on land or sea, that can be put in comparison with the nearly unbroken success with which the British Admiralty, throughout the long period of time alluded to, directed the action of the force at the head of which it stood. There was no Kolin, no Kunersdorf, no Jena, no retreat from Moscow, no Leipzig, no Waterloo, to be scored up on the other side of the account. Amidst difficulties very much more serious than any likely to arise at the present day, or in an early future, the necessary supplies of British fleets, wherever employed, reached them in a fulness and with a regularity altogether unknown to any land force or any other sea force. There must have been some special quality or characteristic in a system of command and strategic direction that enabled it to stand successfully so protracted a series of such exacting tests as was presented by the succession of hostilities in the days of the Georges. In all that time of serious stress no one seems to have thought of suggesting—certainly no responsible person thought of admitting—that the Admiralty required "strengthening" by the formation of a War Council. The reason is plain: the Admiralty was itself a War Council. It was not supposed to be an establishment maintained primarily to deal with material. That was entrusted to technical experts under the Navy Board, subject to the orders of the Lord High Admiral or the Commissioners for executing his office.

Conversion of Admiralty effected in a time of material development.

The conversion of the institution that held executive sway and command over a fighting force into one primarily engaged in providing the material equipment of that force was, like most conversions, effected slowly. It was begun when the distinction between the two was removed and the subordination of the latter to the former was abolished. The magnitude of the change was not perceived at first. Few people foresaw that command would be swallowed by supply; and it was not understood that, indispensable as the latter is, it must not be supreme, or even equal in influence, if efficiency is to be maintained. Within a few years after the change was introduced the era of a long naval peace appeared likely to endure. The consideration of great strategic questions was of continually diminishing urgency, and consequently less frequently occupied the minds of the highest naval authorities. Concurrently with this there was an

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immense, unprecedented, and rapid development of mechanical ingenuity. Wood as a material of shipbuilding was being supplanted, at first slowly, then with increasing rapidity, by iron. Steam was taking its place as a means of propulsion. The manufacture of ordnance was undergoing hitherto unexpected improvement. The quality and action of explosives and projectiles were being investigated with thoroughness. Highly ingenious contrivances for increasing and for resisting the effect of gun-fire were being frequently devised. New weapons—the locomotive torpedo and the under-water mine—were being prepared for the use of combatants.

Results of the change.

Taking men as they are, have always been, and—so far as can be predicted—always will be, it was not surprising, indeed it was only natural, that minds for which strategic problems offered little or no occupation should be turned towards contemplation of the material appliances with which inventors were startling the world. It was to men of the greatest intellectual activity and vigour that the new state of things most powerfully appealed. By the law of their being, they could not stand mentally idle because they were in the midst of a period of strategic tranquillity, in which the conduct of war and all its exacting problems seemed too remote to merit immediate or much attention. The adaptation of the new development of material to naval requirements offered itself in irresistibly attractive guise as the subject on which the mental vigour that they were endowed with, and could not suppress, might be expended. Thus it was that the finest minds in the Navy passed over into the camp in which what has been conveniently called the National School had set up its new and glaring standard. History—that is, the recorded experience of the men who had taken part in and had directed hostilities—was neglected and, indeed, openly disparaged. Consideration and examination of the tremendous problems of warfare might be left to the few who cared about such things, and who were ready to submit to being thought mere antiquaries or persons incapable of rising to full appreciation of the material progress of the age. Nevertheless, here and there some "Solitary Cocker continued to assert"—almost beneath his breath, it must be admitted—that two and two still make four in human affairs, and that in a fighting force, however elaborate and costly its material equipment, man is of as much importance now as ever. It was these who handed on the torch to successors so that the light of belligerent efficiency, faintly as it might sometimes glimmer, should never be extinguished.

Altered international conditions.

In the last quarter of the nineteenth century there was a great expansion of naval effort. Flags hitherto almost or quite unknown appeared on the sea. Small navies grew steadily into great ones, and

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it was borne in on the minds of all who looked beyond their immediate surroundings that a new condition of maritime affairs had arisen. Ministries of Marine and Admiralties learnt the impressive lesson that it was not enough to design and provide ships and armaments; it was also necessary to be prepared to use them. The effect of long submission to the belief that the material is the most important factor of belligerent efficiency now showed itself plainly. Each development of a rival navy's material was met by imitating it. If the displacement or the horse-power given to a ship increased in one country, a corresponding increase was adopted in others. The size, weight, or calibre of one navy's guns dominated the size, weight, and calibre of the guns which others were to have. Did one country introduce or extend the use of a new weapon, its rivals promptly followed suit. Changes in the thickness or quality of protecting armour-plates in one fleet produced similar changes everywhere else. Successful conduct of naval warfare was thereby supposed to be reduced to the simplest rule of thumb. All that was attempted, all that was thought necessary, was to copy a rival's material, giving to the copy a small percentage in excess of dimension. Here was a royal road to the dominion of the sea!

Weakness of a merely imitative policy.

Yet, simple as it was, its justification was not established. In general in war it is better to frustrate an enemy's movements than to mimic them. The principle should be kept in mind in the preparation for war. The aim should be not to make the most perfect possible copy of an opponent's devices, but to do something that will render those devices ineffective. That is the secret of warfare. It would be a poor protection against rain to go out in a heavy shower with a watering-pot rather than an umbrella. The activity of modern building-slip competition raised doubts as to the wisdom of an exclusively imitative policy. To these doubts must be attributed the demand for war councils and naval staffs. Absorption in the work of dealing with material was seen to leave much to be desired as regards preparation for war. There was a general awakening to the truth that the adoption of a type of warship or of a weapon should be governed, not solely by the fact that it had been introduced elsewhere, but by its capacity for effective employment in the operations of war. Recognition of this was a step in the direction of restoring strategical and tactical considerations to the predominant position which they must occupy if warfare is to be conducted successfully. Amateur strategists, by whom a glimmering of the truth had been discerned, thought that the moment had come for the introduction of labels. Call one body of men a war council and another a naval war staff, and every condition of belligerent efficiency would be satisfied.

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It was Abracadabra over again; belief in the magical potency of a form of words. What was wanted was not innovation, but restoration; not new designations, but resumption by the supreme authority of the function of strategical direction and command. The Ministry of Marine that first accepts this and acts upon it will have gained a long march upon its rivals.

CYPRIAN A. G. BRIDGE.

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CHAPTER V.

Types of Warships and their Origin.

Fifty years ago war-fleets were in a state of transition. The operations in the Black Sea and Baltic during the years 1854 and 1855 had pronounced the doom of wooden vessels, but for a long time the right type of future warship remained undecided. We lagged behind France in the adoption of ironclads and rifled ordnance, loath to part with our wooden walls and smooth-bore guns. Some truth lay in what an able French admiral wrote at that time: "In the genius of naval shipbuilding for war purposes, and also of artillery, England seems to be deficient. She squanders millions and produces nothing which is peculiarly her own or that satisfies her own requirements." When we made a spurt in ironclad construction it was to perpetuate the broadside system, which held its ground for another twenty years, despite its obvious disadvantages with modern artillery. A British naval officer, Captain Cowper Coles, had indeed urged an entirely different procedure and mounting guns in the centre of the ship on the turret principle instead of on the broadside, to which view he had been led by an incident in his career. During the Russian War a British light squadron entered the Sea of Azoff to destroy stores of grain, provisions, etc., for use of the garrison of Sebastopol. Being very shallow, even boats could not in many cases approach near enough to the shore to use their guns with effect. Lieut. Coles therefore constructed a raft and mounted a 32-pdr. gun on it, which, drawing much less water than the launches, could get close to the land. Its efficiency as a gun platform led him in succession to design a shield for protection of the gun's crew, and then to place the gun on a turntable to give better angular training.

The Crimean War.

At the attack on the Russian forts at Kinburn, in which two French floating batteries coated with iron plates participated, he saw in the number of their ports another weakness of the broadside system, which strengthened his advocacy of mounting ships' ordnance on the centre line in revolving cupolas, with apertures just large enough to allow the muzzle to project and have sufficient vertical movement for elevation. Ordered home in the autumn of 1855 to explain his views to the Admiralty, Captain Coles could make little

Captain Cowper Coles.

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headway as regards their practical adoption. We were then steadily building wooden line-of-battle ships, and continued to do so for some years. At the beginning of 1864 I went out to the North American station in a new 90-gun wooden two-decker—the Duncan—though when the French built La Gloire we followed, in 1859, with the Warrior, a broadside ironclad frigate with eighteen guns on each side. In 1860 Captain Coles read a paper at the Royal United Service Institution on his shot-proof gun-shields as adapted to iron-cased ships, and their superiority to the Warrior design. He proposed a ship of similar dimensions carrying eighteen guns mounted in pairs within nine stout shields or cupolas—the term turret had not then come into use. Five of these cupolas were to be on the centre line of ship, the other four were disposed in pairs *en échelon* at bow and stern, so that all eighteen guns could be discharged on either side, while four guns commanded right ahead and right astern fire. Similar plating to that of the Warrior (4½ inches) was to protect the hull, but no portholes weakened the structure and allowed entry to shot or shell. While the guns were similar in weight to those carried by the broadside ship, the cupola ship mounted only half the number, which her designer considered equivalent, as all could fire on either side.

Early turret ships.

Here we have the germ of our modern Dreadnought—an all one-calibre gun, multi-turret vessel. To the objection that the cupola would get full of smoke when the breech of the gun was opened after firing, Captain Coles proposed an air blast through the gun, such as we have fitted now to prevent the back flame from cordite. At first this design appeared suitable for coast defence only, and in 1862 our Admiralty decided to apply it to two vessels experimentally. A three-decker, the Royal Sovereign, was cut down and coated with 5½-inch armour plates. Four turrets were placed on the centre line and revolved by steam power. The foremost turret contained two 300-pdr. guns and the others a single gun of same calibre. The other vessel, the Prince Albert, was of iron, designed and built specially for trial of this principle. She also had four turrets on the centre line, and was launched in May 1864. Two months later the Royal Sovereign was subjected to a series of tests at sea, with satisfactory results. She had short masts for signalling, and being without sail power this vessel, as well as the Prince Albert, was not considered suitable for service outside home waters.

Devastation.

It is unnecessary to recount how, to meet this presumed defect, we built the masted sea-going turret-ships Monarch and Captain, for they only represented a passing phase, and our naval construction at that time mainly consisted of broadside ironclads. In the Devastation, commenced early in 1869, we see the true turret system first

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applied to a sea-going mastless vessel. Twin screws enabled her to dispense with sail power, but guns had increased in weight to 35 tons, and hence within a limit of 10,000 tons she could not carry more than two turrets, each containing a pair of 12-in. guns of 35 tons weight. We had rejected breech-loading some years before, and these muzzle-loaders, from want of length and indifferently mounted, gave very poor shooting. The gun capacity of the vessel rested upon these four pieces, for no secondary armament beyond anti-torpedo-boat ordnance was supplied, or indeed considered necessary. Few raised objection to the design being repeated, with certain improvements, in the Thunderer and Dreadnought. Indeed, all extolled the last-named as a splendid specimen of warship.

Secondary armament introduced.

After 1880 we first began to combine a secondary armament with four of the heaviest guns then made, and the reason is not far to seek. In succeeding ships to the Dreadnought we began to concentrate the armour on a small portion of the hull, in order that it might be as thick as possible. A considerable area was therefore unprotected and attackable by light ordnance. Hence we find French ships of that period given a secondary armament of eighteen 5½-in. guns, while our own Admiral class carried a battery of 6-in. guns. The influence of armour is to compel your possible adversary to mount a heavier gun. As protection improved in quality, and thinner plates became possible, they began to be spread over a greater area of the hull again, until the target for, say, a 6-in. gun had again disappeared. Then we find first 8-in., then 9-in., and lastly 10-in. guns associated as a secondary armament with 12-in. guns; and they are mounted on the broadside system, whereby only half can be employed against a single ship.

The defect of the old Dreadnought lay in the fact that her offensive capacity was limited to four guns, and this total number being contained in two turrets only, if any cause put either out of action, the ship lost half her gun power. In the present Dreadnought the total of heavy guns is increased to ten, and the number of turrets or gun positions to five, so the disablement of two would still leave more than half her gun power intact. In this respect she resembles the early turret conceptions of Captain Coles.

The Monitor.

It has been claimed for Ericsson, the eminent Swedish engineer, who built the Monitor, rendered famous by her fight with the Merrimac during the Civil War in America, that he originated turret ships and the present Dreadnought. His conception, however, differed considerably from that of Captain Coles, though both men had come to the same conclusion independently—that the correct way of mounting guns was in a revolving tower or turret, and not on the broadside. Ericsson never favoured a craft with more than one turret, and the

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design of the Dictator—a large Monitor—was altered to meet his views in this respect. He wanted to concentrate offensive power in a single pair of very heavy guns within a structure made as impregnable as possible with armour, and having complete all-round fire. Though we built later a few single-turret vessels, the principle found no general acceptance here, and the deservedly great fame of Ericsson rests upon too sure ground to suffer by giving just due to another. The double-turret battleship, without secondary armament, had its culmination in the old Inflexible, with four 80-ton muzzle-loading guns, and then came the system of adding a secondary battery amidships of 4·7-in. or 6-in. guns.

Admiral class.

Commencing, in 1882, with the Admiral class, this system continued with little variation up to the advent of the present Dreadnought. It may be briefly described as a pair of 13·5-in. or 12-in. guns in a turret at each end, and a secondary battery of 6-in. guns on each broadside. A later variation consisted in associating a few 9·2-in. with the 6-in., as in the King Edward VII. class, and lastly replacing the 6-in. entirely with ten 9·2-in. guns in two vessels—the Lord Nelson and Agamemnon. Now, if all those ten guns could fire on either side, they would—supported by four 12-in. guns—constitute a most formidable armament, but mounted five on each side, only half the secondary armament is available against a single vessel. From consideration of this, one is irresistibly led to the inference that if those ten guns are replaced by five individually heavier, and mounted amidships so as to fire on either side, we should have a more powerful armament. We thus come to the design of the present Dreadnought. Its principal feature is the replacement of a mixed armament by one of guns of a single calibre. Ten 12-in. guns mounted in pairs in five turrets or gun-houses, supplemented with light anti-torpedo-boat guns only, constitute the ordnance equipment of this vessel. Not all the turrets are on the centre line. In order to prevent undue length of ship, as well as to increase bow and stern fire, two of the turrets are placed abreast each other, with the result that one masks the broadside fire of the other. Such an armament requires great length of vessel for its disposition, but length is conducive to speed, so we find in the Dreadnought a considerable increase over the Lord Nelson in both respects, with the result that she is also 1400 tons larger. It is, therefore, hardly fair to compare the two vessels, though, I believe, some officers have declared their preference for the smaller battleship. Engaged broadside to broadside, one would bring to bear eight 12-in. guns against the other's four 12-in. and five 9·2-in. armament. Equally well handled and fought, there should be no reasonable doubt of the issue.

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Foreign Types.

Let us now briefly consider the types of battleship favoured in foreign countries. France, having led the way with a broadside ironclad, continued this method of construction for some years, but at an early stage combined with it a few heavier guns, mounted singly *en barbette* at the corners above the battery. Thus began the barbette system, in which the gun fires over an armoured redoubt which protects the mounting, leaving the piece itself exposed. It continued in favour across the Channel for a considerable period, the guns thus installed increasing in size and becoming the principal armament, though usually mounted singly, and not in pairs, as was our practice at that period. France did apply the turret to some small vessels, but reserved them for coast defence. We saw sufficient merit in the barbette system to apply it to the Admiral class, which succeeded the old Inflexible, and our present plan is a compromise between pure barbette and the old turret. The French, however, of late years, seem to have abandoned the single-barbette gun and followed our practice of mounting, at each end of the vessel, a pair of 12-in. guns enclosed by armour, and a number of lighter pieces on the side. French barbettes.

This principle we see developed and extended in the Danton type, comprising six vessels constructed between 1904 and 1909. Of about 18,000 tons displacement, they have a pair of 12-in. guns at the end and three pairs of 9·4-in. guns on each side. The armour varies from 12 to 9 in. thick, and is fairly distributed over important points. The speed—19 knots—may be considered sufficient for a battleship. It is thus evident that, in 1905, having before her the Lord Nelson and Dreadnought designs, France then preferred the former. It is said, however, that the battleships now being laid down will not have this dual armament, but one comprising twelve 12-in. guns. Danton type.

Thirty years ago no country exhibited greater originality in design or boldness in execution as regards naval construction than Italy. After acquiring a few broadside ironclads, the Italians adopted the turret system, and produced the Duilio and Dandolo, with two turrets placed diagonally and each carrying a pair of 100-ton guns. We adopted the same principle in the old Inflexible with somewhat lighter ordnance. These vessels were under 12,000 tons—then considered by us the maximum dimensions a battleship should attain. Italian naval officers and constructors had other ideas, their originality and boldness being specially marked in the design of the two succeeding vessels, Italia and Lepanto. Having been obliged, in order to give great thickness of armour, to limit exceed- Italian designs.

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ingly the area covered, it is now discarded altogether from the exterior hull and restricted to a protective deck. The turret system is abandoned, and an armoured redoubt placed diagonally across the vessel, at each end of which a pair of 100-ton guns are mounted *en barbette*, giving broadside as well as fore-and-aft fire from all pieces. Considerably longer than previous vessels, their speed was also greatly in excess of former constructions, as also their weight, which approximated to 15,000 tons, of which the central redoubt alone demanded 2500 tons. No doubt the Italia and Lepanto had defects, but with the essential attributes of being able to steam fast and hit hard, they would have proved most formidable antagonists to any craft then afloat or projected. Decried at the time by many as monsters, they are worth recalling in view of the advance in size and speed since made by other nations.

After these vessels Italian construction falls into ordinary line. Financial considerations no doubt imposed moderate dimensions and numbers. The Benedetto Brin, of 13,400 tons, has a triple armament of 12-in., 8-in., and 6-in. guns, while in the Regina Elena, of 12,500 tons, the 6-in. are omitted and the 8-in. increased to twelve, mounted in pairs, six on each side. The vessels now projected are of the Dreadnought type, and it remains to be seen whether any original features will be introduced.

United States.

The United States has also introduced some novel ideas in warship construction, though, like ourselves, not always with success. Almost the first to adopt the triple armament, they have, on the other side of the Atlantic, placed in some ships a pair of 8-in. guns in a reduced turret above the larger 12-in. turret. There appear to me considerable objections to this plan, but as it was not applied to many vessels I will not enumerate them. In earlier vessels 8-in. are combined with 6-in. in addition to four 12-in. guns; in succeeding designs 7-in. supplement the 8-in. There seems no advantage in having two calibres so nearly equal. Up to within a few years ago, high speed was not considered essential in America for battleships. The argument, as expressed in an official report, was as follows:—"The best vessel is not necessarily the one that most quickly can get in or out of battle or keep out of battle, but is rather the one that can remain in battle the longest after she gets there. With equal displacement, higher speed means deficiency in some other quality." There is truth in this if extra speed is given at the expense of armament. Another argument from, I think, the same source ran in this form. We have 600 tons, say, available for another gun or more powerful machinery to give an extra knot in speed. If we select the latter it is a less durable addition, for the

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extra knot will probably disappear in a short time at sea, whereas the gun is permanent, and will not lose power in the same period. Hence we find American battleships of pre-Dreadnought days with speeds not exceeding 18 knots an hour. In later designs this is exceeded, and we also find the mixed armament definitely abandoned. The Michigan and South Carolina, of 16,000 tons, have a speed of nearly 19 knots and eight 12-in. guns, all mounted in pairs on the centre line, the second and third turrets being on a higher plane than those at the extremities of the vessel, so as to allow of their guns pointing over the end turrets, enabling four guns to be directed right ahead and astern. Now, if they can be so fired without detriment to the outer gun positions, the design possesses the advantage that, with two guns less than our Dreadnought, an equal broadside fire is secured. It only gives, however, an end-on fire of four guns against six. Another novelty in the Michigan pair are the means whereby elevation is secured for observation, signalling, etc. Masts in some form are required. The tripod method was adopted in the Dreadnought. It is not novel, having been advocated by Cowper Coles and applied to the Captain for sailing purposes. It gave less interference with turret-gun fire than ordinary rigging. But the three iron masts forming the tripod are of great weight, and probably mainly on this account the Americans have, in the Michigan, placed two masts constructed like an Eiffel Tower of steel lattice work Though offering a comparatively large target, presumably it is expected that projectiles will pass through without doing great damage; but if the resistance is sufficient to explode a shell a different result may follow.

North Dakota.

In the North Dakota type the centre-line system of locating turrets is continued and extended. Five are carried, with a pair of 12-in. guns in each, so all ten pieces will discharge on either broadside, while the bow and stern fire is equal to that in the Michigan. The outer armour varies from 11 in. to 5 in. thick. The contract speed is 21 knots. No question arises now of maintaining former rates. The fact is that when planning a hull to carry such an armament, no difficulty is found in finding space for machinery of great power. The displacement must advance by leaps and bounds, so one is not surprised to find this design involving 20,000 tons weight. Nor does the United States apparently mean to cry halt at this point. A pair of considerably larger vessels are to follow, with probably six turrets on the centre line and anti-torpedo-boat guns. On the other side of the Atlantic advocates of a secondary armament have no influence upon battleship construction, but they may find satisfaction in noting that these American Dreadnoughts are to have 5-in. guns for torpedo

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defence, and it is but a step to the 6-in. When, however, we leave the rapidity of fire and ability to place a large number which appertain to such a piece as the 12-pdr., or even 4-in. gun, for heavier ordnance devoted to this purpose, we are probably approaching a reaction and another method of using gunfire to repel torpedo attack.

Japan. The policy of Japan in warship construction is naturally followed with interest in view of the fact that this nation has at command the latest experience in modern fleet actions. Advocates of a secondary armament have their strongest argument in pointing to what the Japanese have produced since the war. The Satsuma, of 19,000 tons, has twelve 10-in. and six 6-in. in addition to four 12-in. guns. Apparently doubtful of the wisdom of installing a piece so approximating to the power of the 12-in. as the 10-in., this calibre is omitted in Japan's latest battleships, which are to be armed with 12-in. and 6-in. guns, the torpedo defence being committed to a number of 4·7-in. quick-firers. The retention of the 6-in. is significant. Did these guns exercise a great influence in the battle of Tsushima? However valuable that experience, three causes prevent it being conclusive to my mind. First, the Russian fire had little effect upon their opponents, whose light guns would not, therefore, suffer to any considerable extent. Secondly, the appliances for controlling and directing heavy-gun fire were, at that time, crude. Thirdly, the Russian accounts dwell upon the terrible effects of the big shells—portmanteaux, as they are called. I should attach greater importance to Russian procedure after this experience, but observe that their new battleships are to carry twelve 12-in. and sixteen 4·7-in. guns—the latter, no doubt, for torpedo defence. If 6-in. or even 8-in. guns had effected such great execution against them in that terrible battle, would not such guns be insisted upon in any designs put forward at home or abroad for their reconstructed fleet?

Germany. Fifty years ago the Navy of Prussia consisted of two sailing and two steam frigates, one corvette, and a number of gunboats. We had assisted to create this force. The first foreign man-of-war I met in the early 'sixties flew the Prussian flag. It was a 36-gun sailing frigate, the Thetis, which in 1854 we gave to Prussia in exchange for two small paddle-ships, the Recruit and Weser. During our war with Russia, the Weser, commanded by the late Sir Edmund Commerell, did good service in the Sea of Azoff. It was in this vessel that for a dashing exploit he gained the Victoria Cross. The Thetis was used as a Prussian training-ship.

It was not, however, until after the war with Austria in 1864 that Prussia determined to construct a modern fleet, and in 1867 a naval programme was approved. Their first ironclads—obtained

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abroad—were of the broadside type, but too few in numbers to resist the French Fleet in 1870. Continuing their programme after that war, Germany first favoured the double-turret vessel and then returned to the broadside system. The shallowness of the Baltic on the German coast imposed light draught, which kept dimensions to a moderate tonnage. Thus the early Sachsen class displaced about 7500 tons.

After 1890 we see a great advance. Home resources for ship-building had expanded and larger vessels are turned out. The Brandenburg class are distinctly original, with a pair of 11-in. guns *en barbette* at each end and a third pair amidships, but the displacement is limited to 10,000 tons. This disposition of heavy guns in a comparatively small vessel necessarily affects the power of adding a secondary armament, which in the Wörth class was almost non-existent. It led to suggestions at the time to remove the central 11-in. guns and replace them with a 6-in. battery. I do not think this was actually carried out with any of the group, but we see the prevailing influence in the next designs, where the primary is sacrificed to the secondary armament. The Barbarossa type of 10,800 tons have four 9·4-in. and fourteen 6-in. guns. No doubt the reasons for reducing the biggest piece to a 9·4-in. calibre were weighty, but I have never been able to discover them. They held the field, however, for in the Wittelsbach class which followed the only change in armament is to increase the number of 6-in. guns to eighteen. By this time the programme of 1898 was deemed inadequate and the Navy Law of 1900 doubled the strength to which Germany aspired. She now decided to have thirty-eight modern battleships for her fleet, to be completed or laid down by 1916. This gave a great impetus to naval construction and all the industries connected with it. There is also an advance in the size and armament of the vessels provided. The four 9·4-in. are replaced by the same number of 11-in. guns, and a 6⅞-in. calibre forms the secondary armament. The displacement has gone up to 13,000 tons. Such are the German pre-Dreadnought vessels contemporary with our Bulwark and King Edward classes. Our extra tonnage is mainly in coal.

The Nassau type.

It is difficult to say what type of battleship Germany would have adopted next if we had continued building Lord Nelsons, which were a great advance upon the Bulwark and King Edward, but the peculiar features of the Dreadnought at once commanded attention and reconsideration of the position. Germany then decided to follow suit. It involved great changes in designs and appliances, so that building operations, hitherto regular in turning out two battleships every year, received a check. In 1907 no battleship is launched, but the following

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year we see the result of mature consideration and well-organised preparation. The first four German Dreadnoughts take the water. If the art of warship-building is one easy of assimilation and capable of acquisition in a few years, one would expect to find in the Nassau, Westfalen, Rheinland and Posen elements of superiority to our first Dreadnought. But they do not present these to my mind. They are certainly larger, being 18,200 tons, and that is a novelty in German policy, for she has hitherto kept to smaller dimensions than we required, but the disposition of the armament appears faulty. These ships have twelve 11-in. guns, of which a pair is mounted at each end and two pairs abreast on each side. Consequently in a broadside action four heavy guns are idle, and the fire is maintained by eight guns only, or the same number as our Dreadnought, but inferior in calibre.

British *v.* German guns.

The statement is sometimes made that Krupp guns are superior to British make, to the extent that his 11-in. is equal to our 12-in. This I do not believe of contemporary marks or patterns, for we have as able gun designers and manufacturers as any in the world. It is possible, however, that a late 11-in. gun should have equal if not greater penetrative power than an early 12-in. gun when opposed to armour-plating. On the other hand, the more powerful shell of the larger calibre must tell with greater effect where perforation is achieved. With guns of approximately the same period of design, penetration and destructive power must, unless ammunition is inferior, be in ratio to calibre. Our guns and powder give velocity; the projectiles must do the rest. Are ours inferior to those provided by foreign nations? There is good reason for a negative answer.

Secondary armaments.

But these German ships do not rely entirely upon their 11-in. guns. They have a secondary armament of twelve 6-in. guns, six on each side. Now, when the heavy-gun positions are restricted to the bow and stern there is no difficulty in finding efficient positions for lighter ordnance; but when that intermediate space is absorbed by more heavy guns the problem becomes difficult; the secondary must go above or below the primary armament. In the Nassau it is below, and, in my opinion, inconveniently near the water-line. Whether it adds sensibly to the fighting power of these ships is a matter of opinion according to whether you are an advocate of mixed armaments or not. There is no doubt, however, that these first German Dreadnoughts are fine vessels, and if they exhibit some defects this casts no discredit upon the designers, who had a most difficult task. The general principles of warship design, as of gun destruction, are well known and no monopoly of any nation; but it needs many years' experience, practical as well as theoretical, gained at sea and in the

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office, assisted by the traditions of centuries, to produce a craft in which everything is located to the best advantage, with the result that besides being the most efficient machine she is not rendered unsightly, lumbered with top hamper, or crowded with weapons which impede each other.

We may, however, admire without stint the methods by which a modern fleet has sprung up in Germany, the creation of all those necessary adjuncts to hull and machinery which differentiate the warship from the merchant vessel, and the growth of that industry which a few years ago seemed hardly capable of such rapid expansion.

Armoured cruisers.

It is unnecessary to deal at length with what are termed armoured cruisers. They have grown like other types until now some are little distinguishable from battleships. It matters little what vessels are called; the main point is what they can do. In the Inflexible class there is reduced armour protection but an increased speed over the Dreadnoughts. This renders them more suitable for detached service, without debarring them from the line of battle.

Besides these we require a number of swift vessels for scouting, despatch and commerce protection, which need not be heavily armed nor armoured. We are progressing towards this in the new second-class cruisers of the Newcastle type. It is doubtful, however, if the necessary qualities can be secured under a displacement of 7000 tons. Cruisers should have an excess of speed of 5 knots an hour over any battleship or merchant vessel in order to escape from one and overhaul the other. Interruption to commerce is most likely to proceed from the swiftest merchant steamer an enemy can procure from his own or another's mercantile fleet. Only the very best of our own, or a faster cruiser, would prove effective in stopping such depredations. Besides speed and the ability to retain it against wind and sea, a good supply of fuel is essential to a cruiser, or she can only keep the sea for short periods. These attributes entail considerable displacement, and hence my opinion that the second-class cruiser will shortly exceed 5000 tons.

It is unnecessary to dwell upon the smaller units of a war fleet. There is no great dissimilarity with destroyers. The demand for increased speed and better sea-keeping qualities have led to greater dimensions. Our Swift, of 36 knots and 1800 tons, will probably mark a halting point for some time at least. I lay most stress upon battleship construction because under no circumstances can it be improvised. Our commerce and passenger craft can augment other classes, but nothing can do the work of a line-of-battle unit unless designed and built for the purpose. We could not hope to add one battleship within a year of ordering. It now takes two years, but that

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is ordinary construction. Presumably by working night and day with extra shifts this period could be considerably decreased, but whether on completion the need would still exist is open to much doubt.

Dimensions of battleships.

Bearing upon this point a significant fact to-day is the disappearance of the small ironclad, or second-class battleship, at one time largely represented in our own fleet, but latterly mainly found in navies of lesser maritime states. Now we observe Austria, Brazil and other countries acquiring the largest types. In these days of heavy cost for every item of a war fleet there is no more difficult problem than to determine how a small sum towards such service is best distributed. Much can be said against allocating a large proportion to a single huge craft liable to all the chances of peace as well as war. Still more, in my opinion, against the vessel which, under the plea of moderate dimensions, does not carry any weapon capable of very hard hitting. I should say the smaller the battleship imposed upon me by financial and other considerations, the heavier the gun she must carry, and limit the quantity rather than the quality of her weapons. The old Dreadnought, with her four 38-ton guns, hull and armament well protected, could stand up to larger vessels with a good chance of success. The ancient Benbow, with a 100-ton gun at each end, was capable of dealing terrific blows to any antagonist. A second-class battleship need not have a second-class weapon, as a 9-in. or 10-in. gun may be considered compared with a 12-in. or heavier ordnance. In a letter by Sir William White to the *Observer* nearly a year ago, on the big ship, he said:—"We believe that the development of submarine attacks renders it undesirable to pursue the policy of continuous increase in dimensions and cost of successive ships. We do not think that earlier vessels—such as the American Connecticut or British King Edward class—are incapable of making a good fight, ship against ship, with the Dreadnought class." Here I cannot agree with him, being of an opinion that in either case—handling and shooting on both sides being equally efficient—the Dreadnought would have an easy victory.

The case would, I think, be stronger put in this way. Three Dreadnoughts carry thirty 12-in. guns. If we distribute the thirty guns among five ships, so that each is armed with six 12-in. guns, would not that be more advantageous when many vessels are necessary? As compared with the Dreadnought we have two guns less on the broadside, which is not a serious discrepancy. Moderate is a relative term as regards dimensions. After the Royal Sovereigns were designed, with an increase of 2000 tons over previous battleships, I read a paper at the Royal United Service Institution putting forward the case for moderate dimensions. In the discussion that

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followed my views were much criticised by Sir William White, the designer of those ships. In reply I admitted the necessary superior qualities of the bigger ship, but said they would no doubt be still further evidenced in a 20,000-ton ship. Well, here we are at the 20,000-ton ship, and the same arguments apply. Already the advance towards 30,000 tons has begun. Where are you to stop?

Influence of the torpedo.

Another argument against the mastodon vessel is the under-water menace from mine or torpedo. We may foil the heaviest air projectile by armour, but no constructive device seems capable of withstanding the blow given by a large explosion against the hull under water. Probably the locomotive torpedo fails to influence naval construction as regards dimensions owing to its limitations, notwithstanding the advance made since Mr. Whitehead put his torpedo forward over thirty years ago. Speed and accuracy have increased a hundred-fold, but for the rough usage of war under all conditions of weather and temperature it lacks simplicity; while low velocity, even at comparatively short ranges, imparts a great element of uncertainty to the application of the Whitehead torpedo. A 12-in. projectile will reach an objective at, say, 4000 yards in about five seconds. The Whitehead torpedo, allowing we can obtain with it a speed of 40 knots for a range of 2000 yards, will take a minute and a half, or ninety seconds, to reach an object at that distance. If in both cases it is a ship moving at a speed, say, of 15 knots an hour, she will, while the shot is travelling 4000 yards, advance 115 feet, or less probably than half her length, whereas during the passage of the torpedo over half the range she will advance 750 yards, so that the under-water missile has to be directed that distance ahead of her to make a hit. Of course allowance is made for these movements in each case, but what a fruitful cause of error we have with a time of flight of ninety seconds! If speed of enemy is miscalculated, or even neglected altogether, the gun, if aimed at centre of ship, does not under these circumstances miss its mark. I have heard that at the battle of Tsushima the Japanese vessels were mainly struck in the after part. Was this due to neglecting speed of enemy on Russian gun sights? Of course speed of enemy cannot be neglected in directing the torpedo, but I leave my readers to work out the effect in both cases of over- or under-estimating that speed by, say, two knots. In these few remarks it may be possible to gather why the torpedo has not exercised any appreciable influence upon the growth of dimensions, and as a weapon for use at sea the last great war did not increase its reputation. Greater simplicity and a much higher velocity seem essential to give this form of attack a more assured position in naval warfare.

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Mines.

What a submarine explosion can effect was, however, vividly demonstrated in that war on both sides. The sinking of the Petropavlovsk with most of her crew—including the gallant Admiral Makaroff—in a few minutes, and still more the fact that the only important losses of the Japanese at sea were from submarine mines, points a lesson we should not ignore. Admiral Togo, with all his care and desire to maintain his fleet intact until he could deal a crushing blow, had to see his eight battleships reduced to six owing to mines. Nothing availed to save from this insidious weapon; but what an argument for such a superiority in numbers that we can face such liabilities without imperilling our supremacy! This, if anything, will eventually lead to a halt in dimensions, though it may take another great war to enforce the lesson. More than one war was required to show that for general purposes the two-decker had special advantages over the three-decker. The analogy is imperfect to-day because in most cases small sailing-ships were speedier than bigger ones—frigates than two-deckers, the three-decker worst of all. With a steamship size is conducive to speed, but every addition to length improves the chances of locomotive torpedoes. In advancing from vessels 330 feet long to super-Dreadnoughts 510 feet in length, the bull's-eye for the Whitehead is enlarged by 60 yards; for a hit at the extremities, though not perhaps entailing immediate sinking, must bring about disablement. So far the easier target has not materially improved the status of this weapon. When someone evolves a missile able to travel under water at a speed of 100 miles an hour for a considerable distance, and carry a heavy charge of explosive, a radical change in naval construction will doubtless follow.

Improvement in gunnery.

Look, on the other hand, at the shooting now made by heavy guns and the improved rapidity of their fire. Hits are made on a moving target not nearly as large as a ship at distances of from 6000 to 8000 yards. The largest pieces now seem to make the best shooting, while there is not much difference as regards rapidity of aimed rounds between the 9·2-in. and the 12-in.* We must go down to a 6-in. calibre to obtain any considerable increase in this respect, but the hits do not correspond. It is said normal fighting will be at closer range, when a secondary armament of 6-in. guns would prove most effective. If on coming to closer quarters these weapons are intact, or if circumstances prevent long-range firing from the beginning, a hail of small projectiles may do considerable damage.

Finally, can anyone predict type or types the future will produce? The pendulum swings first one way and then back as regards

* 1908. Rounds per minute, 12-in., 2·73; 9·2-in., 3·65.
Hits ,, 12-in., 1·11; 9·2-in. 2·37 —Ed.

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armament, but the general principles of naval warfare remain unchanged. Financial considerations, however, generally decide where any uncertainty exists. I think Captain Mahan suggested in some work that international agreement should be directed towards a maximum of size rather than of numbers. Though less difficult in practical application, it could hardly prove satisfactory and avoid friction between nations. The state of the national purse will have more influence, and as all realise that at the present rate of progress first-class battleships are fast approaching to a cost of two millions each, as compared with half a million fifty years ago, so there will ensue, without compact or treaty, a halt in this rapid march, and time will be given for reflection. With the experience afforded by recent constructions we ought to be able to form a clear idea of how gun-power is best adapted to a single vessel as regards number and size of pieces. We have examples of the mixed armament and the single calibre, moderate and high speed, long and comparatively short ships. As far as peace conditions can afford some definite conclusions seem possible, and it appears to me not unlikely we shall find the pendulum swinging back to certain ideas prevalent years ago, though obscured for a time by circumstances over which their exponents had no control.

S. Eardley-Wilmot.

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CHAPTER VI.

The German Navy.

"Mit dem Schwert muss auch ein Glaube sein."

In the *Naval Annual* last year the writer of these pages was privileged to discuss the causes, and some of the effects, of the enormous naval expansion of Germany. The causes were found in the great increase of population and foreign commerce, the swelling volume of exports—which have grown by 55 per cent. within twenty-five years—the large dependence of the country upon raw materials and to a growing extent upon food from abroad, and in many other things which impel Germany to the sea and give a somewhat poignant significance to the saying, "*Bitter not ist uns eine starke deutsche Flotte.*" If not altogether, yet in a large measure, as the Emperor said, her future lies "on the water." The subject was not exhausted, and might be pursued here—though that is not the intention—into a consideration of the financial situation of Germany, her growing wealth combined with great budget deficits, and the precarious state of some of her industries in view of the possible closing of markets or the hardening of the conditions of competition, with the consequence of the over-capitalization and overmanning of industries, which might react gravely on the internal situation of the country. No one who has studied the economic position of the German Empire, and its gradual transformation from a mainly agricultural to a mainly industrial State, can doubt for a moment that the creation and expansion of the modern German Navy are due to one of those unquenchable national impulses which have in all times shaped the destinies of the human race. And here, and in this relation, it is fitting to pay a tribute of admiration to the national force, the co-ordinate effort, the sustained endeavour, and the practical patriotism which have contributed to place Germany among the foremost maritime nations of the world.

Subjects to be discussed.

The object of this chapter is to show to some extent what has been done within recent years in developing the German Navy and its resources. The subject falls under three heads—the shipbuilding programme and the progress made in giving effect to it, the *personnel* and its expansion, and the harbours, docks, yards, and canals, which contribute to the effective value of the fleet. The shipbuilding programme deserves to be examined because of its intrinsic importance, and because it has latterly been somewhat misunderstood and misrepresented. The

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personnel attracts attention because of its ordered and definite development, and the spirit and qualities of officers and men. The stationary bases and resources of the Navy claim consideration, owing to the very large part they play in the naval policy of Germany.

The Programme and Shipbuilding.

Origin of the Navy Law.

The rulers and leading thinkers of Germany have ever been wiser, by anticipation, than the people they have ruled and at length inspired. By instinct and history, the Germans were a military people. The "ganzes Deutschland" of the soldier-poet Arndt had been carved out of the possessions of other nations by the swords of soldiers. Upon the seizure of Schleswig-Holstein, the Völkerschlacht of Königgrätz, and the sanguinary battlefields of Eastern France, the Navy had exerted an inconsiderable or, at least, a little observed part. Few of the members of the Reichstag had any conception of the strategical forces that conditioned the protection of the fruits of the national industries. Every year they were accustomed to reject a portion of the shipbuilding programme, and they exerted their power in the very year that preceded the voting of the first Navy Law, which provided for a programme extending over several years. That was in 1897, when a ministerial crisis was the consequence, which brought to power Admiral von Tirpitz, who has since contributed very greatly to the expansion of the Navy by his clear recognition of its necessities and his powerful advocacy of its claims. It was the time of the acquisition of Kiao-chau, of the "mailed fist" and the "German Michael," and the national consciousness of the people was aroused to the future of the country as a commercial "Weltreich."

Thus came into being the "Septennate" of Naval Construction, with its "Aeternat" fixing an establishment of ships, which "Septennate" became law, changed into a "Sexennate," on April 10, 1908. It had run but two years of its course when it was superseded by the more famous Navy Law of 1900, which at first was intended to be a supplement to it. The effect of the latter Act was practically to double the programme of its predecessor, and as first drafted t provided for an establishment of thirty-eight battleships (not thirty-three, as has been frequently stated during recent discussions), fourteen large cruisers, and thirty-nine small cruisers.

Character and development of the Navy Law.

"Novelle" of 1906.

In view of recent controversies, certain points in the Navy Law which are important call for explanation. The Act has twice been amended, in 1906 and 1908, and the "Novellen" in which these amendments have been embodied have had their origin in two different sets of considerations. The Law of 1900 had been curtailed by the Reichstag, which had struck out six large and seven small

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cruisers from the programme. But this decision was a matter of compromise, and it was known that, at a suitable moment, the Government would ask for provision for these cruisers, or some of them, again. That this was the case was shown by the explanation given of the "Novelle" of 1906 when it was accepted by the Federal Council:—

> When the present Navy Act was proposed in 1900, the German Governments considered it necessary, for the due representation of German interests abroad, to ask for a greater number of men-of-war than had been provided in the first Navy Act of 1898 for this purpose. The increased number asked for amounted to six large and seven small cruisers. It was not intended to commence the construction of these cruisers till the year 1906, in order to complete the battle fleet first. The Reichstag at that time rejected the request. Now that the time proposed for the commencement of the construction has arrived, the United Governments find themselves compelled to repeat their request for the six large cruisers.

It is thus sufficiently clear that the amendment of 1906 did not in any way alter the original programme, except that the small cruisers were not again asked for. It neither retarded the building of the ships nor did it accelerate them. The feature of the completed programme may now be recapitulated:—

> Battle Fleet: 2 fleet flagships; 4 squadrons, each of 8 battleships; 8 large cruisers; and 24 small cruisers for scouting purposes.
> Foreign Fleet: 8 large cruisers and 10 small cruisers.
> Additional for Reserve: 4 battleships; 4 large cruisers; and 4 small cruisers.
> Total Number of Vessels: 38 battleships; 20 large cruisers; 38 small cruisers; in addition, 144 destroyers; also, submarines to be built out of special votes.

The "Novelle" of 1908.

The "Novelle," or addition, of 1908 was of a different character altogether from that of 1906. It did not alter the establishment given above, but it provided for "younger," and therefore more effective, battleships. The age-limit for battleships had been twenty-five years, counting from the date of the voting of the first instalment for the building of the ship to the like grant for the building of her successor. It was as if we, in 1910, should count as effective such vessels as the Sans Pareil, Nile, and Trafalgar. The inadequacy of the arrangement had been a frequent topic of discussion and dissatisfaction ever since the programme had become effective under the Law, and in view of the rapid advances that were being made in the defensive and offensive value of ships of war, a change was vigorously advocated by the Navy League. The object was to reduce the age-limit of battleships to twenty years, being that assigned to the large cruisers, which latter were becoming more and more powerful, until at last they have become Invincibles or super-Invincibles. When Admiral von Tirpitz introduced the proposal to the Budget Committee, he repeated previous statements to the effect that the modernisation of the Fleet had been forced upon the Government by the rapid advances that were being made by other nations. He said that without adequate naval forces at command the German Empire would be compelled to retire from the arena of

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world politics, and, echoing the dominating thought that underlay the Navy Law—which had been so forcibly expressed in the memorandum that accompanied it—he added that it was "imperative that other Powers should realise that it was more advantageous to come to terms with Germany than to make war upon her."

Additional ships.

The effect of the change effected in the law was that in the four years 1908–1911 four big ships were to be laid down in each year, viz., three battleships and one armoured cruiser or cruiser-battleship. This accession to the programme took no one by surprise who had observed the tendency of public discussion in Germany, the utterances of statesmen, or the conditions that attend the obsolescence of warships. Indeed, the most remarkable feature of the German naval programme is its fixed and determinate character, combined with an inevitable growth in the power of each type of vessel so that she tends towards the type next stronger. The battleships are Dreadnoughts, the large cruisers are practically as powerful, the small cruisers are becoming bigger, and it would surprise no one if ultimately they became armoured vessels; while the destroyers are increasing in displacement, so that they promise to approach the type of swift cruisers. This progressive modification of the type is in accordance with a well-known law observable in modern naval construction.

The German Navy League had advocated the reduction of the age of battleships for years, and no one had any right to be surprised by what took place. The modification of the Law was inevitable, as apparently is another in, or in anticipation of, the year 1912, when all the additional battleships will have been laid down, and under the provisions of the present programme only two big ships will have to be begun in each year up to 1917 for the completion of the establishment of ships by the appointed year, 1920. When the change of 1908 was made, Herr Bebel, the Socialist Deputy, predicted that additional proposals would be made in or after 1912. The vast shipyards and the national industries will demand it, and the Navy Law has never been regarded as a limiting instrument.

Development of ship-building resources.

Something shall now be said as to the practical effect given to the law. The programme of 1898 had a very invigorating influence on the development of German shipbuilding industries, and when the Law of 1900 was adopted the effect was to bring about very rapid developments. Krupp took over the Germania Yard at Kiel, which the firm had managed since 1896, and by 1902 the great extension of the yard and its resources had been completed. The vast works at Essen and elsewhere developed enormously, and a little later, under the new impulse of acceleration, £2,500,000 of new capital was added to the £9,000,000 which constituted the original stock of the company. At Hamburg, Bremen, Stettin, Danzig, and

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in other shipbuilding and engineering centres, great sums were expended in new plant and in providing new building berths and lengthening old ones. Throughout Germany, indeed, extraordinary energy was devoted to the increase of all these resources. The companies now principally engaged in warship-building are: F. Schichau, Danzig and Elbing; the Vulcan Company, Stettin and Hamburg; the Germania Yard and the Howaldt firm, Kiel; Messrs. Blohm & Voss, Hamburg; and the Weser Company, Bremen.

Execution of the programme.

The battleships of the Wittelsbach, Braunschweig, and Deutschland classes were built, the last of the series, the Schlesien, being completed in the spring of 1908. The construction of the Dreadnought retarded the work, and the temporary paralysis imposed on German shipbuilding did not pass away until 1907, in the spring or summer of which year the Nassau and Westfalen, which belonged to the part of the programme assigned to 1906, were laid down. The interval had been well occupied in the preparation of designs, the collection of materials, and the increase of resources. The two ships named, as well as the Rheinland,* have been completed. The programme of 1907 included also the battleship Posen and the cruiser-battleship Von der Tann, which should now be almost ready for the pennant. With the commissioning of the Posen the first German division or tactical group of four Dreadnoughts will be completed. Not until the next year was the effect of the reduction of the "life" of ships felt in the laying down of a larger number of vessels, the programme of 1908 providing for the battleships Thüringen, Helgoland, and Ostfriesland, now all in the water, and for the cruiser-battleship G.

Alleged acceleration of shipbuilding.

It was in relation to these four vessels that the Prime Minister, the First Lord of the Admiralty, and the Foreign Secretary made some remarkable statements in the House of Commons. The official date for the completion of the Thüringen is the spring of 1911, and for the other vessels the summer of the same year. There had been a certain acceleration in the commencement of one or more of them, and Mr. McKenna, speaking on the Navy Estimates on March 16th, 1909, said the Government expected the vessels to be completed in the autumn of 1910, and added that the collection of materials and the "manufacture of armaments, guns, and gun-mountings" had already begun for the four ships of the year 1909. Admiral von Tirpitz, with reference to this statement, declared in the Reichstag that the acceleration of the 1908 ships was merely a matter of industrial convenience and financial arrangement, and would not affect the completion of the vessels, while as to those of 1909,

* Rheinland and Posen are practically ready for sea, but will not be officially completed till later in the year.—ED.

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contracts would not be placed until some months after the conditions for tendering were drawn up in the late summer.

Possibly too much has been made of the acceleration. Certainly the increase of German means of production was solely due to, and consequent upon, the necessities and promise of the situation, as has been shown above. For reasons not easy to explain, therefore, surprise was expressed as to what was being done. Mr. Asquith described the approaches made by the British Government to the German Government with a view to a possible reduction of armaments, and said, "We have been assured more than once, and in the most formal manner, that their naval expenditure is governed solely by reference to their own needs, and that their programme does not depend upon ours." He added that, in 1908, he had made two assumptions which had not been justified. The first—which, to those who knew the circumstances, seemed surprising—was that the German programme of construction was possibly merely, or in part, a paper programme—a paper programme, at least, in regard to the assignment of ships to particular financial years. The second assumption—admitted to be baseless—was that the Germans could not build as rapidly as ourselves. With regard to the ability of Germany to accelerate her rate of construction, and to the great increase of her resources, Mr. Asquith said, "We knew it, or heard of it, at any rate, last autumn—I think in November—and it was in view of that most grave, and, to us, not only unforeseen, but unexpected state of things, that we had to reconsider our programme for the present year."

Increase of means of shipbuilding foreseen and inevitable.

Upon this subject some reflections may be permitted. There can be no doubt that the resources of Germany for warship building are immensely greater than they were—several large German companies have not yet undertaken the building of warships—nor is it to be questioned that they make possible an acceleration of shipbuilding in case of necessity, just as is the case in this country. In all this there is nothing that should surprise English people, who have seen a like increase of resources as the result of the long-range programme of the Naval Defence Act. In every shipyard in Germany where warships are built there have been additions to existing resources, and the Vulcan Company at Stettin, not content with its old establishment, has opened a new yard on the Elbe, where the battleship Ersatz Heimdall is in hand. The Krupp ordnance and armour works have been increased in capacity, because they have the monopoly of supply in Germany, and it was necessary that they should be in a position to complete the requirements of four capital ships for the German Navy each year, with reserves of guns, and at the same time should be able to furnish the armour and ordnance for any foreign ships for which contracts might be obtained by

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German yards. It was a practical certainty that the Krupp Company would provide an ample margin, and that they are able to supply the component parts of eight battleships per annum, as was stated by Mr. McKenna in the House of Commons, is a fact that should have surprised no one. It is impossible to believe that the Admiralty were otherwise than well informed on the subject. There appears to be little doubt that the battleship Ersatz Frithjof, which is building at Danzig, has been somewhat accelerated, this probably being due to complete a second tactical group of four ships, and thus to constitute a Dreadnought squadron.

Framing of the Navy Law. Votes and loans.

Very little shall be said with reference to the finance of the Navy Law of 1900. Certain provisional calculations were made at the time as to the probable expenditure that would be involved, but these have practically been reduced to waste paper by the changes subsequently made. The intention, from the very beginning, was to raise a large part of the money for shipbuilding by loan. A resolution of the Reichstag was to the effect that from 1901 onward the whole cost of the armament of new ships (instead of two-thirds as formerly) and 6 per cent. (instead of 5 per cent.) of the increased value of the fleet (*Prozent des Wertes der Flotte*) should be borne upon the ordinary estimates, the remainder falling upon loans. This is a very important point to be borne in mind. According to the scheme, with the additions that have been made to it, the ordinary expenditure in 1910 would be £15,690,000, and the sum raised by loan £6,250,000, while in 1911 the amounts would be respectively £16,860,000 and £6,225,000. The calculations show expenditure in this manner up to the year 1917, though the amount to be raised by loan is proposed to be progressively diminished. But the Law of 1900 made no financial provision. It merely stated that the necessary charges must be inserted in the annual estimates. The estimates for 1910, in round figures, are shown in the following table to illustrate the distribution of the expenditure under the several headings :—

Recurring (*fortdauernde*) expenditure, excluding the Kiao-chau administration	£7,700,000
Shipbuilding and armaments :—	
Ordinary	7,400,000
Extraordinary	4,550,000
Other non-recurring (*einmalige*) expenditure :—	
Ordinary	600,000
Extraordinary	990,000
	£21,240,000

Of this total, the sum of £5,550,000, being the extraordinary expenditure, will be provided out of loans. This feature of German naval expenditure is often misunderstood.*

* It will be observed that the estimates of 1910 do not attain the figure contemplated. Before the "Novelle" of 1908, however, the sum set down to be voted for 1910 was £13,387,000, and that to be paid out of loans £2,630,500.

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Officers and Men.

Increase of the *personnel.* Officers.

It has always been a great merit of the Navy Law that it has made compulsory an adequate provision of officers and men upon an expanding scale commensurate with the expansion of the fleet. A regular increase in the number of executive officers is in progress, in correspondence with the memoranda issued with the several revisions of the Navy Law. In 1910, the addition will be 2 rear-admirals, 4 captains, 10 frigate or corvette captains (commanders), 27 senior lieutenants, 52 lieutenants and sub-lieutenants, one chief (or staff) engineer, 9 staff engineers, with 25 juniors, 2 marine officers, 13 medical officers, 9 accountant officers, and 9 torpedo and other officers. The total numbers to be reached in 1920 are:—18 admirals and vice-admirals, 25 rear-admirals, 122 captains, 289 commanders, 667 senior lieutenants, 922 lieutenants, and 605 sub-lieutenants.

Warrant officers and men.

The increase of warrant officers and men is regulated by Art. III. Sec. 4 of the Navy Law. There is to be an establishment of warrant officers and men at the following rates:—(1) full complements for the ships of the active battle fleet—now the High Sea Fleet—and for one-half of the torpedo-boats, school ships and special vessels; (2) part complements (engineer *personnel* two-thirds, and for the rest one-half of the full number) for the Reserve battle fleet and the second half of the torpedo-boats; (3) one and a half the number of men required for ships serving abroad; (4) the men necessary for shore service; (5) an excess of 5 per cent. on the whole establishment. The total number of warrant officers and men in the estimates for 1910 is shown in the following table, the increase on the previous year being given:—

	Chief Warrant Officers.	Warrant Officers.	Bandmasters.	Chief Petty Officers.	1st Class Petty Officers.	2nd Class Seamen.	Men classed as Leading Seamen.	Men.	Petty Officers of Boys' Division.	Boys.	Total.
Seaman Divisions .	158	236	8	118	1346	2021	4139	12,417	—	—	20,443
Boys' Division . .	—	—	—	—	—	—	—	—	96	1554	1,650
Harbour Divisions:											
Engineer *personnel*	344	690	—	—	1413	2120	2148	6,447	—	—	13,162
Others	40	81	—	62	385	577	431	1,292	—	—	2,868
Torpedo Divisions .											
Seaman *personnel* .	25	49	—	36	206	309	700	2,099	—	—	3,424
Engineer *personnel*	97	193	—	—	465	696	946	2,837	—	—	5,234
Total 1910	664	1249	8	216	3815	5723	8364	25,092	96	1554	46,781
Total 1909	629	1182	8	207	3583	5374	7810	23,428	96	1554	43,871
Addition 1910 . . .	35	67	—	9	232	349	554	1,664	—	—	2,910

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Profes-sional value of German officers and men.

The personal value and professional qualities of German officers cannot be discussed here. No one who has met them will doubt that they are men of high character and true patriotism. That they have a right ascendancy over their men is certain. That they are highly trained, and men of education and scientific attainments, as well as earnest students of the duties of their profession, cannot be questioned. "Mit dem Schwert muss auch ein Glaube sein." This was a motto placed at the head of an article in the *Marine Rundschau* which expressed the spirit of the German Navy. That there has been faith, confidence and thought with the sword of Germany anyone can see—thought in looking far into the future, and thought in the training for the production of efficiency. They have absorbed the spirit of Clausewitz, and do not look upon wars as other than the makers of peoples, whose unity and government are fashioned by them, nor regard them otherwise than as the sources in which truth, rectitude, honour and strength of character are found. The writer referred to discovered in Lord St. Vincent, in his joy of service (*Dienstfreudigkeit*), what he described as real "old Prussian forces." These are the forces whose spirit is inculcated in the modern officers of the German Navy.

As to the men, they are of excellent physical quality and well disciplined, and they carry themselves in a manner that speaks of their pride in their service. The great majority of them are men of short service, embodied from the seafaring population, and it is scarcely possible that they can be made so thoroughly efficient as long-service men. But this does not apply to the special ratings, and the men as a whole seem to have a high level of general intelligence. That they form an excellent body of seamen and artificers is a matter that calls for no demonstration.

Naval Bases, Dockyards, and Canals.

Bases of the Navy. Kaiser Wilhelm Canal.

German thoroughness is nowhere more visible than in the unresting energy with which the policy of developing the dockyards, arsenals, factories, and the systems of canals has been carried on hand-in-hand with the development of the Fleet. The French saying, "Qui veut la fin veut les moyens," is practically applied in Germany. If a large fleet was to be created, adequate waterways and dockyards must be provided; Wilhelmshaven, Kiel, Danzig, and all private yards have moved rapidly under the impulse. The Navy Law implied something of a shifting of the centre of naval gravity. The requirements were more in the North Sea than the Baltic. The passages of the Great Belt, the Sound, the Cattegat, and the Skager Rack must be avoided

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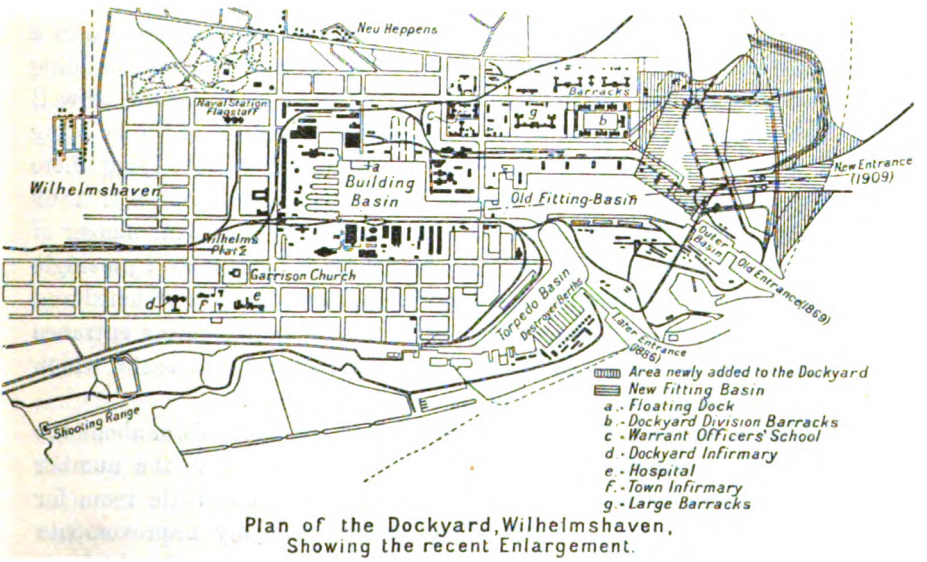
and the Kaiser Wilhelm Canal was constructed. That was in the days before the Dreadnought, but as soon as the word went forth for the building of the first German Dreadnought, the widening and deepening of the canal was considered and very soon determined on. Something like £11,000,000 will be expended on the canal, its locks, and its bridges, but, by a neat financial arrangement, the cost will not fall upon the Navy Estimates.

Character of the North Sea coast.

The North Sea coast of Germany is mainly inhospitable, with long stretches of dreary sandbanks and sedgy shallows. From the Elbe eastward to the Dollart, Nature has done very little to assist the German Navy. Like Cherbourg, Wilhelmshaven on the Jade is entirely an artificial creation, and was inconvenient and encompassed



Plan of the Dockyard, Wilhelmshaven, Showing the recent Enlargement.

with sandbanks. It is now the second largest naval port in the world, and in the spring of 1910 becomes the principal base of the High Sea Fleet, of which one squadron will always have its base there. Kiel may to some extent suffer by this transfer, but such is the importance of that place that no effort will be spared to bring it as rapidly as possible into direct communication with the North Sea. A waterway capable of admitting the passage of Dreadnoughts is necessary to the German Navy, not only strategically, but because the immense resources of the Kiel dockyard and of the Germania and Howaldt yards there, as well as the resources further east, must be made available for the support and maintenance of a fleet operating in the North Sea.

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Wilhelmshaven.

The difficulties at Wilhelmshaven have been enormous. There is a rise of tide of as much as 30 feet, and such is the silting up of sand and mud that, between the moles at the entrance, where the scouring action of the current is arrested, the amount of matter removed every year by dredging is equivalent to a depth of about 33 feet. The land taken for the new harbour works consisted of marshy flats, which would be swept by the sea but for a new dyke that has been built to protect them. When Wilhelmshaven began—then known as the "Marineanlagen bei Heppens"—there was no drinking water; a third of the workmen were soon down with malaria, food and necessaries were scarce, and building materials had to be brought from a long distance. The new harbour was opened by King William I. on June 17, 1869. It consisted of the moles at the entrance, a lock leading into an outer basin, and another lock opening thence to a canal which was carried three-quarters of a mile inland to the building basin, where there were three docks and two building berths, as well as the necessary slips and works. The inland position of the building basin was selected with the object of protecting vessels lying there from being shelled from the sea. The *Flottengründungsplan* of 1869 and that of 1873 impressed upon the naval authorities the danger of depending upon building and docking resources approached by a single entrance and a long canal. Accordingly, the canal was widened and reconstructed as a fitting basin, while a second and better entrance was made to the south in relation to a new torpedo basin, which opened through a lock to the Ems and Jade canal.

New works at Wilhelmshaven.

These works sufficed for the service of the Fleet from about the year 1886 onward, until, with the Navy Law of 1900, the number and dimensions of ships began to grow. There was little room for enlargements to the south, where, however, many improvements have been made, and more are contemplated on land to be obtained. Accordingly, a large area has been won from the Jade by the construction of a great sea dyke beginning at the old harbour entrance, and extending in a curve northward towards Mariensiel. Here is the splendid new harbour entrance, lately completed, approached between two long moles and having two entrance locks, which are 853 ft. long, and severally 131 ft. 3 in. and 114 ft. 9 in. wide at the entrance. These locks are closed by floating pontoons, both on the side of the Jade and the fitting basin in the harbour, and through them the biggest Dreadnoughts in prospect can pass at any state of the tide. The building basin in the harbour, which is now being deepened, has been extended a distance of about 330 ft. to the north; and here are the three new dry docks, which are 624 ft. long and have a mean width of 98 ft. 6 in. They have been constructed to accommo-

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date the largest warships now building, with a wide margin for increase. The electrically-driven pumps are such that a dock can be emptied of water within an hour and a half. The docks will cost more than was expected, and the total will not fall far short of £2,000,000. The third entrance to the dockyard, the enlarging of the building basin, and the laying out of the new fitting basin are likely to cost as much. One of the old building berths on the basin has been lengthened and adapted for the building of big ships by the addition of modern cranes, etc., and on this both the Nassau and Ostfriesland have been built. To the north of the new entrance, and opening to the fitting basin, a new basin is being laid out, providing ample berthing space for vessels of the largest size. While all this has been going on, much building has been in progress in the yard, and modern plant has been laid down. A new shop for producing the largest turbine machinery is now in progress. The whole establishment is supplied with electric light and power from a central station, the dynamos being driven by steam turbines of 3000 H.P. Another electric station of like power, with the possibility of increasing to 6000 H.P., is in hand in the south part of the yard.

The hydrographic conditions of the place have been referred to. Between the entrance moles, and in other places, the silting up of mud involves constant dredging, while generally in the inner Jade the strong scouring of the tide makes this unnecessary. At the opening of the Jade to the North Sea, there are, however, shifting sandbanks, caused by the eastward drift of detritus from the East Friesland Islands and Wangerooge. Considerable works are in prospect with the object of preventing any danger to vessels passing to or from the dockyard at Wilhelmshaven, and money is devoted in 1910 to further work in improving the fairway.

Canals.

The Ems and Jade Canal has been referred to. It opens at Wilhelmshaven to the new torpedo-basin, and it is said that the waterway has been so widened as to admit of the passage of large destroyers, which can thus navigate between Wilhelmshaven, on the Jade, and Emden, at the mouth of the Ems. The latter is now a very important commercial harbour, with extensive docks and quays at which large ships can be berthed, and the port is also a torpedo station. It is in communication, by the Ems and an important canal, with Dortmund, Essen, the Westphalian coalfields, and the Rhine valley. All these places and their resources are thus brought into communication with Wilhelmshaven. Again, it is expected that the Jade will yet be linked by a canal with the mouth of the Elbe, opposite to Brünsbuttel, where the Kaiser Wilhelm Canal debouches from the Baltic. Money is also being expended in fortifying this

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coast, so that the position of Germany in the North Sea is much stronger than it was.

Kiel. Nothing that is being done at Wilhelmshaven or elsewhere can be said to diminish the importance of Kiel. The magnificence of its harbour and the greatness of its resources in the Imperial Dockyard, the Germaniawerft of the Krupp Company, and the Howaldtwerke, will ever make it a place of high value essential to the maintenance of the Fleet. For some years past the dockyard has been in course of enlargement in area and resources. New shops and offices have been erected and fitted; a shop for the making of the largest turbines is to be completed this year; a large new power-house is to be erected; the electric station is being enlarged; a new berth for ships completing or under repair, with machine shops adjacent, is approaching completion; a great floating crane is almost completed, analogous to one that has been built recently for the Germania yard; and a large floating dock, and a smaller one for destroyers, are in hand.

Danzig. In every direction resources are being developed for the increase and maintenance of the Fleet. Thus, at the Danzig dockyard, where submarines are to be built, a horizontal slip is in progress. An enlargement of the torpedo factory at Mürwik is to be completed this year, and at the like establishment at Friedrichsort additions are to be made, while at Diedrichsdorf a laboratory and torpedo trial station are to be built. In various places new magazines are being erected. At Helgoland the new war harbour, when completed, will have cost about £600,000, while large sums are being expended to protect the island from erosion.

Conclusion. This catalogue of works in hand for the needs of the German Navy might have been extended. The object which has been kept in view in this chapter is to illustrate the organic character of the naval development, and to show how intimately it is related to the progressive evolution of the industrial resources of the Empire. With the ordered increase of the *matériel* of the Fleet proceeds the addition to, and higher training of, the *personnel*, and hand-in-hand with these developments goes forward the provision of docks, harbours, and static resources of many kinds. German imagination and deep thinking are seen in the broad character of the scheme, German thoroughness in every part of it, and German energy in the manner in which effect is given to it.

JOHN LEYLAND.

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CHAPTER VII.

The Efficiency of the Factors Contributing to Speed in Ships.

The use of the turbine for the propulsion of warships has brought about changes in the generally accepted standards by which the efficiency of the various factors contributing to speed is measured. With reciprocating machinery the practice up till quite recently had been to take the coal consumed in the boilers per unit of power indicated by the main engines as the principal result for purposes of comparison. Occasionally the strokes made by the boiler feed-pumps were counted to arrive at an approximate estimate of the water consumption, and this enabled the rate of evaporation in the boilers, and the quantity of steam used in the machinery, to be determined with some degree of accuracy. Other data were taken in a few instances for the information of those responsible for the design of machinery for succeeding ships. The coal consumption, however, still remained the principal comparative standard accepted by the general engineering public. With the fitting of turbines the practice was introduced of taking more scientific and accurate data, and in the later ships with reciprocating engines water consumption and other results were similarly measured. Now there is a general disposition to embrace in the ascertainment of efficiency many other factors, and a consideration of this important development in engineering opinion and practice may well form the main theme in reviewing the outstanding incidents of the year, so far as naval engineering is concerned.

Measuring power of turbines.

The change is, in the first instance, attributable to the difficulties experienced in the earlier turbine ships of ascertaining the power developed. In the reciprocating engine this is done with the aid of a steam indicator which shows the pressure within the cylinder during the stroke of the piston; but a corresponding method is impossible in the case of turbines, and a system (first devised by the Hon. Charles A. Parsons, and used by him on the Turbinia) of measuring the power by the torque of the shaft was developed. The torsion meter is based on the fact that when a long shaft is transmitting power one end of it twists relatively to the other, *i.e.*, the far end in its motion lags a little behind the end to which the power is initially applied. The amount of twist is proportional to the power transmitted, and a torsion meter is simply a device for measuring the lag. This being measured, the

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corresponding horse-power is readily calculated from the elasticity of the shaft, which is carefully measured in the shops before being fitted on board. There was doubt as to the accuracy of the readings of the earlier instruments, although this has since been dispelled. In order, partly, to get corroborative data, it was decided to gauge the water consumption, and now, in nearly all warships, water-measuring tanks are provided on the contract trials, so that a record may be kept of the exact quantity of water passing to the boilers, there to be converted into steam for use in the main engines and in the auxiliary machinery. Sometimes the records for main and auxiliary machinery are taken separately. The water consumption, with the shaft horse-power, gives an accurate measure of the thermo-dynamical efficiency of the turbines, and of the auxiliary engines—a result which was not usually obtained in earlier practice, except with specially fitted water-measuring tanks or other apparatus for specific purposes. A study of the results deduced from the information thus available has enforced the importance of including other elements. The efficiency of the boiler must be reckoned in the count, and the consideration of propeller results has forced itself upon professional attention during the past year more than at any previous period, because of the high speeds desiderated. Engineers are now beginning to realise more fully that what must be aimed at is not the results in the boiler, engine, or propeller separately, but the efficiency of the whole combination, taking into account the proportions of the hull for a given displacement, the lines of the ship, the quality of the coal, the evaporation in the boiler, the provision against heat radiation from the pipe connections, the thermo-dynamical efficiency of the turbines and auxiliaries, the value of high vacua, and the efficiency of the propeller. It may be well, even in the absence of a comprehensive "figure of merit," including all factors contributing to the efficiency of warship propulsion, to review the recent trend of design in respect of each of these factors.

Importance of testing all-round efficiency.

And first, as regards the proportions of hull for a given displacement, the development has been principally towards increased length. This dimension, perhaps more than any other, increases cost. That can be readily appreciated when it is recalled that every 10 ft. of broadside in a line-of-battleship, to be effectively protected, involves for armour alone the expenditure of nearly £5000; and, in addition, there is material for framing, plating, bulkheads, etc. Again, it is always undesirable to increase the length of target presented to the enemy's fire. Notwithstanding these considerations, the length between perpendiculars of our battleships has increased from the

Influences of greater length of ships.

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425 ft. of the King Edward VII. class in 1903 to the 490 ft. of the Dreadnought in 1906, and the 545 ft. of the Conqueror class, the latest battleships. In the case of armoured cruisers the advance has been even more remarkable. From the 490 ft. of the Minotaur in 1904, we advanced to the 530 ft. in the Invincible in 1906, to the 570 ft. of the Indefatigable in 1909, and to the 660 ft. of the latest ships. This increase in length is necessary for the accommodation of the greater number of boilers consequent on greater power and speed, but also satisfies the claims of the primary armament and the need for adequate space in order that the large guns may be trained through wide angles. There has probably been less restraint in increasing length to meet these desiderata, especially in the cruisers, since the general influence of increase of length is to favour speed. It increases the ratio of length to breadth. In the first battleship named the proportions are 5·45 of length to 1 of beam, in the later ships 6·15 to 1. In the cruisers the change in only six years is more marked, from 6·6 of length to 1 of beam to 7·46 to 1. We have therefore virtually a narrower ship. If this increase were not coupled with augmented demands in other directions, less power for a given speed, or higher speed for a given power, would result. Even greater demands might be met while maintaining the same speed condition on a certain fixed power. Thus, it has been stated that, mainly because of increased length in the larger vessels, a speed of 22½ knots could have been maintained for approximately 25,000 horse-power by each of the following three ships, notwithstanding their different displacements:—The Edgar, 360 ft. long, and of 7350 tons displacement; the Blake, 375 ft. long, and of 9000 tons displacement; and the Terrible, 500 ft. long, and of 14,200 tons displacement. In other words, we have double the displacement propelled at 22½ knots for very little increase of power, by increasing the length of the ship from 360 ft. to 500 ft. This is, of course, apart from the practicability of satisfactorily installing the machinery of the required power within the dimensions of hull, which could not have been done in the smallest of the ships named.

Resistance and effective power.

Increase in length, of course, adds to the area of wetted surface and, proportionately, to the skin friction, which constitutes one of the resisting influences to be overcome by propelling power. With higher speeds it becomes of increasing importance to minimise the residuary resistance—that due to wave and eddy making. A careful estimate of the probable effective power required for overcoming these two forms of resistance in a 27-knot ship shows that in a ship 530 ft. long between perpendiculars, and of 17,250 tons displacement, the power required to overcome skin-friction resistance is equal to

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about 0·84, and residuary resistance to about 0·85 effective horse-power per ton displacement, whereas in our latest cruisers these figures may be 0·75 and 0·68 effective horse-power respectively per ton displacement. There is not only a great reduction in the power required, equal in the aggregate to a saving of about 15 per cent. in the total effective power per ton displacement, but the residuary resistance, instead of being equal to the friction resistance, is only in the ratio of about 0·91 to 1. As confirmation it may be asserted that with the limitations imposed by other considerations—for instance, the passenger accommodation required—the Lusitania and Mauretania could not have been built to cross the Atlantic at the high speeds they achieve (25½ to 26 knots) if the length had been limited to 700 ft. instead of the 785 ft. adopted. With the reduced dimensions the power necessary would have been at least 10 per cent. greater and could not possibly have been installed in the shorter ship.

The effect of beam on stability and speed.

While increased length thus favours speed, the question of beam is of some importance from the point of view of speed, as well as of stability. The displacement being fixed by the ordnance and other requirements, and the draught limited by dock and harbour considerations, the beam is determined with relation, firstly to the under-water form, and secondly to the initial stability. To minimise the residuary resistance fine lines are essential. Much reduction of the breadth by filling out the under-water portion leads to a bluff entrance, with possible disastrous effects upon the speed, while undue increase in beam may have the same effect, although to a less degree. This may be exemplified by a comparison of the results of model experiments of two hulls, the displacement being the same:—

(A) Length 360 ft., beam 45 ft. 9 in., draught 18 ft. 1¼ in.
(B) „ 360 ft., „ 37 ft. 2 in., „ 16 ft. 3 in.

In the latter case (B) the under-water portion was filled out to make up the displacement. The result was that at 18 knots the residuary resistance in (B)—the narrower ship—was three times greater than in (A), and the friction resistance only 2 per cent. less. Beam can only be increased provided the entrance is fine, and, though to a less extent, the run also; but this latter is sometimes kept broad to augment the metacentric height, which by the way has increased of late years from about 3½ ft. to about 5 ft. in the latest battleship designs, due to increased dimensions, principally beam. The run of the water-line aft is widened; but the shape of the under-water portion aft, which is the real "run," is practically unaffected. The important final result is greatly to increase the range of stability. There is some advantage in respect that the gun platform can be higher and thus

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facilitate the disposition of torpedo-repelling guns, without affecting stability or speed; but this is partly nullified because higher gun platform is usually accompanied by additional side armour.

Stream lines at the propeller.

The desire for higher propulsive effects involves the study of stream lines, and naval architects engaged in designing ships which require more than usual care in the proportioning of screw propellers, are seeking for fuller information regarding the state of motion of the water near the stern of the ship in motion. In particular, they desire to assess the speed of the wake current, among other phenomena in this region. The only method at present known is by direct experiment, which may be made in a model tank establishment. Froude has published the results of such research work on various occasions, and the data accumulated, and the deductions made from an exhaustive series of experiments on one model at Messrs. John Brown & Co.'s experimental tank, were given in a paper read at this year's spring meeting of the Institution of Naval Architects by Mr. W. J. Luke. The results cannot be dealt with here; they are directly valuable, and are indirectly useful if only as an incentive to further research. It is well for the science of naval architecture that commercial firms and capable experimenters are ready to give the profession the benefit of such data, acquired at considerable cost in time and money.

General results of greater dimensions.

It will thus be recognised that the increase in length in our latest warships, while enabling armaments, as now fitted, to be more satisfactorily disposed in order to widen the arc of training, has also conduced to ease in propulsion, and that the higher speeds of 27 and 28 knots are realised for 10 per cent. to 15 per cent. less power than would be the case with shorter ships, other things being equal. This is, of course, apart from the question of the accommodation of armament above and of the machinery, magazines, etc., below. The greater beam desirable has not been inimical to high speeds in view of the increase in length ensuring fineness of entrance. The greater beam, increasing the metacentric height, gives a greater reserve of stability, which is vital in a warship since a large portion of the water plane may be flooded, as a result of perforation by projectiles, without the ship's stability being endangered. A large metacentric height gives the advantage of stiffness against inclining forces, but has the disadvantage of making the ship unsteady as a gun platform in a seaway.

Economy in propelling power.

Having considered the effect of recent developments in dimensions on efficiency in speed, we may turn now to review the equally important question of economy in producing the power expended by the propellers in driving the ship. The weight of coal consumed per

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unit of power in a given time is but a poor estimate of efficiency In the first place the heat value of coal varies greatly. Scotch and some other coals have 10 per cent. fewer British thermal units than Welsh coal, so that unless the thermal value of the coal be considered, comparisons are misleading. By measuring the water evaporated in the boilers, which gives the steam consumption, it becomes easy to determine the evaporative efficiency of the boiler as well as the steam consumption of the machinery.

Elements conducing to evaporative efficiency of boilers.

The evaporative efficiency of the boiler is the first element in this determination of combined efficiency, and it must be confessed that little progress has been made recently in regard to the steam evaporated per lb. of fuel consumed. It is true that it has been possible, by a more suitable arrangement of tubes, etc., to get a greater weight of steam per unit of heating surface, but the weight of steam produced per unit of fuel consumed has not varied very much beyond 10 lb. per 1 lb. of coal. The Admiralty Committee on Boilers of seventeen years ago, presided over by Admiral Buller, laid it down as an essential condition that the ratio of heating surface to grate area in British warships should be 33 to 1 under natural draught working. In the King Edward VII. class it was 30 to 1, so that Admiralty designers are obviously aiming at easy steaming conditions in the boiler-room —burning less fuel per square foot of grate. It should not be forgotten, however, that now any excess steam provided can be most economically utilised in the turbines themselves, whereby the power can be increased by overloading in the case of emergency. Parenthetically it should be stated, however, that it is not always possible efficiently to utilise the excess power in driving the ship at higher speeds, as the propellers and the form of the ship may not be suited for an addition to speed, above the designed rate, equivalent to the increase in power. In the case of fast protected cruisers fitted with express boilers working under forced draught, the proportion of heating to grate surface has been increased from 53 to 56 per unit of fire-bar area, but here forced draught is an element, and in most cases oil is used alternatively with coal. The heat value of the fuel used and the experience of the stoker are important considerations. For instance, in ships built for South American Powers, where it may not be prudent to depend upon Welsh or other anthracite coals, and where stokers may not be sufficiently skilled to ensure a high fuel consumption per square foot of grate, the tendency is to have about 36 square feet of heating surface for each square foot of grate area, notwithstanding that this augments the size of the boilers for a given power. A few years ago the practice was to allow in the British service 2½ square feet of heating surface per unit of power developed

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under natural draught; this is now reduced to about 2¼ in modern ships.

Designs of present-day boilers.

This increase in efficiency is due to the development of improved types of boilers, which admit of better utilisation of heat from the products of combustion, and of a higher degree of forced draught when required, without detriment to circulation. A better understanding of the effect of forced draught on a given type of boiler has also contributed in no small measure to the improvement indicated. In the early days of its introduction in warships its improper use was undoubtedly responsible for many failures. Now fuller knowledge amongst those engaged in the design and working of naval machinery has resulted in a more rational use of this valuable means to economy of weight and to flexibility in service. The experience gained in the British service has apparently justified the preference for two types of boilers—the Babcock and Wilcox and the Yarrow. The space for combustion in the former type is approximately 4·05 cubic feet per square foot of grate area, and in the latter 5·8 cubic feet per square foot of grate, comparing two similar ships. In both types this amount of combustion space is found to be sufficient for the combustion of coal, and for a combination of coal and oil fuel. The products of combustion in the Babcock and Wilcox boiler pass through a path 26½ ft. long in their travel from the combustion chamber to the base of the funnel uptake, while in the Yarrow type the gases traverse the much shorter space of 10¾ ft. The sizes of tubes generally used in the Babcock and Wilcox boiler are 3$\frac{5}{16}$ in. diameter for the two lower rows, and 1$\frac{3}{16}$ in. for the remainder. In the Yarrow type, as installed in large ships, the tubes are generally 1¾ in. diameter throughout. The steam generated in the tubes of the Yarrow boiler traverses in its passage to the surface of the water in the steam drum a maximum distance of about 10¼ ft., while in the Babcock and Wilcox boiler this distance varies from 19½ ft. in the lowest row of tubes to 13½ ft. in the top row. The steam space in the Babcock and Wilcox boiler is about 0·048 cubic feet, and in the Yarrow boiler about 0·075 cubic feet per horse-power, comparing similar ships. From both of the above types, widely dissimilar in design, good results have been obtained on trials and in service at sea, and efficiencies of from 65 to 75 per cent., taking the calorific value of the fuel, may be obtained, the lower figure representing approximately the performance at higher rates of combustion, and the higher that obtained at the lower rates of combustion usual when steaming easily.

The superiority of turbines.

There has been a marked improvement in the efficiency of propelling machinery. Of this full proof was given in the two preceding

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issues of the *Naval Annual*.* The Dreadnought had a steam consumption on her official full-power trials of 13½ lb. per shaft horse-power, the three cruisers of the Invincible type worked out at practically 12 lb., the greater power of their machinery being conducive to higher efficiency; even better results are probable in the near future. We are indebted to Admiral H. I. Cone, the Engineer-in-Chief of the U.S. Navy, for official data of the trial performances of recent United States ships directly bearing upon the efficiency of propelling machinery. The battleships Delaware and North Dakota are alike in dimensions, being 510 ft. long between perpendiculars and of 20,000 tons displacement; but the former has reciprocating machinery and the latter Curtis turbines. The important figure is the water, or steam, consumption of the main engines only; the differences in speed are negligible. In the Delaware the power taken for arriving at the rate of consumption is that indicated, and in the other case the shaft horse-power recorded by torsion meter.

Curtis turbines *versus* piston engines.

	U.S. Battleship Delaware (Reciprocating Engines).	U.S. Battleship North Dakota (Curtis Turbines).
Speed	12·24 knots	12·1 knots
Duration of Trial	24 hours	24 hours
Water Consumption per H.P. hour—		
Main Engines only	15·48 lb.	20·6 lb.
All purposes	21·05 lb.	23·94 lb.
Speed	19·225 knots	19·245 knots
Duration of Trial	24 hours	24 hours
Water Consumption per H.P. hour—		
Main Engines only	12·7 lb.	14·25 lb.
All purposes	14·52 lb.	15·92 lb.
Speed	21·563 knots	21·64 knots
Duration of Trial	4 hours	3 hours
Water Consumption per H.P. hour—		
Main Engines only	12·9 lb.	13·8 lb.
All purposes	14·8 lb.	14·408 lb.

Turbine results compared.

Interest continues in the three United States scouts—the Chester, with Parsons turbines, the Salem, with Curtis turbines, and the Birmingham, with reciprocating engines—and no apology need be made for giving data of performances, under corresponding conditions, of all three ships, received from the same official source. It should be remembered that the Salem has the first Curtis installation fitted in a warship. These data, which are tabulated, give, for the Chester,

* See *Naval Annual*, 1908, pp. 94–99; 1909, pp. 89, 90.

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results with the cruising turbines of the Parsons system in use at 10 knots speed. It will be noted that with all turbines in series, h.p. cruising, l.p. cruising, h.p. ordinary and l.p. ordinary, the steam consumption was 28·1 lb. per shaft horse-power per hour for the main engines only, against 42 lb. in the Curtis turbine and 20·94 lb. in the reciprocating machinery. When the cruising turbines in the Parsons system were cut out the consumption increased to 44·9 lb., which establishes the economy of a great range of expansion, whether

	Chester.			Salem.	Birmingham.
Type of Engine and number in use	6 Turbines, Parsons, H.P.&L.P. Cruising and H.P.&L.P. Ordinary.	5 Turbines, Parsons, without L.P. Cruising.	4 Turbines, Parsons, Ordinary H.P.&L.P. Turbines.	2 Turbines, Curtis, with Turbines on each Shaft.	2 Engines, 4-Cylinder Triple-expansion Engines.
No. of Shafts	4	4	4	2	2
Speed (knots)	10·15	10·43	10·15	10·01	10·03
Revolutions per min.	206·3	212·2	206·8	139·3	74·3
S.H.P.	908	823·5	746·6	719·6	1050·2 I.H.P.
Water Consumption per H.P. hour—					
Main Engines only	28·1 lb.	40·95 lb.	44·9 lb.	42·0 lb.	20·94 lb.
All purposes	53·28 lb.	58·39 lb.	63·87 lb.	62·73 lb.	32·44 lb.
Total Water Consumption per hour—					
Main Engines only	25,492 lb.	33,927 lb.	33,539 lb.	30,182 lb.	21,988 lb.
All purposes	43,761 lb.	48,380 lb.	47,690 lb.	45,144 lb.	34,069 lb.
Speed (knots)	18·03	22·62	24·67	25·12	24·15
Revolutions per min.	379	481·4	542·5	369·8	191·5
S.H.P.	5699·2	12,467·8	18,544	18,070	14,543 I.H.P.
Water Consumption per S.H.P. hour—					
Main Engines only	16·5 lb.	12·79 lb.	13·7 lb.	16·2 lb.	17·42 lb.
All purposes	20·26 lb.	15·07 lb.	15·96 lb.	18·89 lb.	20·44 lb.
Total Water Consumption per hour—					
Main Engines only	94,082 lb.	159,435 lb.	253,662 lb.	292,751 lb.	253,372 lb.
All purposes	115,458 lb.	187,933 lb.	296,054 lb.	341,486 lb.	297,300 lb.

provided in separate cruising turbines or by an extension of the ordinary high-pressure turbine suitably arranged to enable the steam to be bye-passed into an intermediate stage when working at high power. The speed results are of secondary importance, as they depend on the state of the hull, weather and other variants. On the official contract trials the Chester steamed 26·52 knots, the Salem 25·947 knots, and the Birmingham 24·325 knots. The remarkable point is that at full power the steam consumption of the

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Parsons turbine is 13·7 lb., of the Curtis turbine 16·2 lb., and of the reciprocating engines 17·42 lb., excluding the consumption for auxiliaries in each case. These were the first turbine ships in the U.S. Navy; improvements since made will ensure reductions in these rates.

U.S. turbine-driven destroyers.

Admiral Cone has also kindly sent the results of six torpedo-boat-destroyers with Parsons turbines. These are 700-ton vessels, with different types of boilers, to steam 28 knots. The speeds realised ranged between 28·35 and 31·82 knots, and here depth of water and other variants may account for the great differences; but we are concerned now only with the steam consumption. Upon the cruising trial of twenty-four hours' duration, at as nearly 16 knots as possible, the average speed was 15·99 knots, and the average shaft horse-power 1206; while the steam consumption for all purposes ranged from 26·16 lb. to 31·05 lb. per shaft horse-power per hour, the average being 27·54 lb. On the second trial of twelve hours' duration the averages were 24·58 knots, 5504 shaft horse-power, and 15·5 lb. of water per shaft horse-power per hour. The full speed results gave the following averages: speed 29·67 knots, shaft horse-power 11,168, water consumption 15·65 lb. per shaft horse-power per hour. The best consumption results, which ought to be realised by all the vessels, were: At 16·135 knots, 23·76 lb.; at 24·8 knots, 14 lb.; and at 30·41 knots, 14·64 lb. per shaft horse-power per hour. The steam consumption in all cases includes that for all auxiliaries.

High steam consumption at low speeds.

The disadvantage of the turbine in warship work, it will be seen, is that the economy falls away at low powers to a greater extent than with reciprocating engines; the Delaware results show this clearly. The amount of steam absorbed by auxiliary machinery accounts in some measure for the high total relative consumption at low speeds. Thus, reciprocating electric light engines on board warships take 28 lb. per I.H.P., the condenser water-circulating engines 45 lb., and pumps, steering engines, capstan engines, and the like 60 lb. per I.H.P., all when exhausting into the condenser. Even with the recently adopted practice of passing the exhaust steam from such engines into the low-pressure turbine, whereby considerable saving in the total consumption is effected—from 8 to 25 per cent., according to the power developed—the results at low speeds are still poor. Thus, when using the exhaust from auxiliaries in the low-pressure turbine, the steam consumption for all purposes in a modern large ship is: At about 2500 H.P., 26 lb.; at about 4000 H.P., 22 lb.; at 8000 H.P., 17 lb.; at 12,000 H.P., 16 lb., steadily improving to 12 lb. at full power. In the earlier marine turbine installations

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Cruising turbines and their alternatives.

an independent turbine was introduced, for use at low powers, the steam being first utilised in it before passing to the main turbines, whereby the range of expansion was increased; in small craft two such turbines working in series were similarly used. This practice continues in the United States and some Continental warships, but in other navies the question arose as to whether in the large ships the saving in steam consumption justified the extra number of turbines and the additional pipe connections. In later large ships for the British Navy the independent cruising turbine is not fitted. The saving in weight of the cruising turbine is utilised in increasing the main turbines in size to compensate partly for the loss of efficiency at low powers. A cruising stage is fitted at the initial end of the main high-pressure turbine, and at low powers only the fuller range of expansion thus afforded is utilised. At higher powers steam is admitted through a bye-pass valve into the turbine at an intermediate stage. This allows a good economy at low powers and reduces weight, cost and pipe complications. In the four latest United States battleships, now under construction, cruising turbines in series are being fitted and will greatly increase economy at low powers.

Parsons' new partial-admission turbines.

The probabilities are, however, that some improvement in the rate of steam consumption of turbines, especially at low power, will be achieved by the adoption of partial steam admission for the initial stage, a practice hitherto associated entirely with the impulse type of machine, but now being adopted by Mr. Parsons, who is introducing a partial flow machine. While the moving blades in this machine are, as in the ordinary turbine, fitted around the complete circumference of the rotor, the fixed guide-blades are not continuous around the casing. Instead, there are segments of fixed blades at equal distances in the circumference of the casing; the alternating parts, having no blading, form a series of chambers. Between the guide-blade segments and such chambers there is packing, which, while it allows the moving blades to rotate, minimises the quantity of steam escaping into the chambers. The steam ports are opposite the guide-blade segments. The steam flowing through the blades continues to fall in pressure, and the successive segments are of increased length to conform with the greater volume of steam. When midway between the entrance and exit in the stage the steam actuating the rotor has fallen below the pressure of that in the chamber, the steam therein leaks again into the blades, and thus the leakage loss is reduced. Each stage, made up of a number of rings of blades, is divided from the other stages, and the steam enters through ports as in the initial stage. For higher powers some of the stages at the high-pressure end may be cut out, the boiler steam

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being bye-passed to any series of ports. Thus the turbine makes a great range possible..

Tests of Parsons' partial-admission turbine.

A turbine of this type has been manufactured for comparative trials with a high-pressure cruising turbine for a third-class cruiser. Running at the same number of revolutions (290 per minute) and under similar conditions, the results were as follows:—

	H.P. Cruising Turbine.	Partial Flow Turbine.	
Initial steam pressure (lb. absolute)	230	140	195
Final " " "	80	55	78
Steam consumption per hour (lb.)	33,000	24,200	33,000
Shaft horse-power	240	248	345

Under approximately the same steam conditions the power was increased by 44 per cent. Since the high pressure cruising turbine develops, when in use, about 15 per cent. of the total power by all the turbines, it follows that the use of one of the new turbines would increase the total power by about 7 per cent. for the same quantity of steam. It is not proposed to limit the use of this partial flow system to cruising turbines: it can be advantageously employed for the high-pressure end of the main turbines with an ordinary drum construction for the remainder of the length.

The impulse partial-admission system.

In velocity compounded impulse turbines the steam, in the case of the initial stages, impinges on the turbine blades from nozzles, any number of which can be closed by manually operated valves, so that the volume of steam admitted can be regulated to suit the proportion of the total power to be developed. This is a distinguishing feature of the Curtis machine, which is being applied in two British cruisers of the Town class—the Bristol and the Yarmouth—and in a torpedo-boat destroyer. It is a feature also of other turbines adopted on the Continent. Mr. Parsons experimented with the principle many years ago, and this plan of using the velocity compounded impulse system on the initial stage is now being adopted in the Parsons turbines fitted to some ships for Continental Powers, but the remainder of the high-pressure, and the whole of the low-pressure, turbine is made on the Parsons reaction system. These applications of partial admission to the Parsons system are, perhaps, the most important recent developments in turbine practice, and justify a consideration of the advantages of a combination over the purely reaction or purely velocity compounded impulse type. The relative merits and demerits of these two separate designs were dealt with in a previous issue of the *Naval Annual*, so that we may confine attention here to the questions which arise from the departure.

So far as the nozzles and blading of the first impulse stage of the turbine go the differences between this new Parsons type, the Curtis,

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and even the A. E. G. (German) turbine are small, and are only in insignificant details. But beyond this initial impulse stage Parsons adopts his successful reaction system of blade; in the other cases the successive stages are of the impulse type, often, but not always, velocity compounded throughout. In other words the former gains some advantage by partial or variable steam admission in the primary stage, which is a convenient and relatively cheap method of achieving economy at low powers, and uses this in combination with the high efficiency associated with the low pressure sections of the reaction turbine. After passing through the nozzles the steam pressure is reduced to about one-half of the working pressure and the steam has become much easier to deal with in reaction blading. The drum construction of the Parsons reaction machine is not only lighter for a given consumption but sufficiency of strength is more easily assured. On the other hand, the continuance in the Curtis and the A. E. G. turbines of the velocity compounded impulse stages involves the loading of the shaft with many wheels, and the introduction between each pair of wheels of a diaphragm of great strength to prevent distortion, and having a very small clearance round the shaft. In the A. E. G. machines drum construction, with impulse blading, is, therefore, used in the low pressure section. With the Parsons arrangement the use of the drum construction with reaction blades, after the one velocity compounded impulse stage, ensures greater rigidity, and the absence of diaphragms, even in the high pressure turbine, makes overhaul less troublesome.

The advantages of combining an impulse first stage with reaction system.

The construction of turbines associated with impulse blading mounted on wheels is limited as to the number of wheels that can be carried by a shaft supported on two bearings. If the turbine is divided into high pressure and low pressure units the pressure of the steam will have so fallen that its volume on entering the low pressure unit will be great enough, even in the case of the subdivision of the total quantity among four low pressure turbines, to make full annular admission desirable. Once this condition is realised, many consider that the light, rigid, and simple drum type of rotor is most desirable, whether this be bladed with reaction blading, *i.e.*, having both guide and working blades of identical forms, or whether it be bladed alternately with guide-blades, of one form fixed on the casing, and impulse blades of totally different shape on the drum.

Constructional questions.

With both types of high-pressure turbine—whether consisting entirely of impulse stages, or of an initial impulse stage and subsequent reaction stages, or partial admission initial stage with subsequent complete admission stages — two arrangements for working at low powers are adopted. The use of nozzles to pass

Disadvantages of the impulse partial-admission system.

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steam at the initial stage has the disadvantage that at low power, with a limited number of nozzles open, the steam is discharged into a region of much lower pressure than at full power; consequently the speed of the steam issuing from the nozzle is proportionately higher, and the steam being under-expanded, the number of nozzles opened is increased; on the other hand, the blade speed is reduced owing to the lower number of revolutions of the turbine at small power. Thus, not only are the relations of steam velocity and blade speed incorrect, either at low power or full power or at both, but there is a tendency to erode the sharp edges of the blades. The A.E.G. turbines, in addition to the above system of regulation, also provide bye-passes carrying the steam issuing from the initial stage at full power to one lower down the turbine, instead of letting it flow through the second stage. This method gets over the difficulty just mentioned, but it has the disadvantage of increasing the total number of wheels in the turbine, and they are not all in active work at full power. Thus, in the high-pressure turbine of a small cruiser there are no fewer than eleven wheels, with a corresponding number of diaphragms, all carried on a single shaft on two bearings.

Solution in using subsequent reaction blading.

In the Parsons turbine, with an impulse stage, the regulation may be effected by the reaction blading, into which the steam flows after passing through the first stage, having its passage-way so constricted that the desired pressure in the impulse stage will be maintained even at comparatively low powers—say, one-fourth. At larger fractions of power a bye-pass opens from this chamber to a point further down the turbine, where the area for flow is proportionate to the full quantity of steam. This bye-pass may be hand worked, but is preferably arranged to be automatic. In this case, of course, the regulation is effected by altering the number of nozzle groups at work on the first stage; but the speed of the steam issuing from these nozzles will be constant within narrow limits, and the pressure in the first stage also will be constant. The likelihood of the steam cutting the blading is thus much reduced. Moreover, at low powers the first part of the reaction blading can utilise a higher steam pressure than would otherwise be the case.

Reversing turbines.

The reversing parts of the turbines we have described will, of course, share the characteristics of the ahead parts, in the use of velocity-compounded impulse blading for the high-pressure, followed by a drum construction for the low-pressure, turbine. An advantage of this type of high-pressure reversing turbine is that it can be embodied in the same unit with the high-pressure ahead turbine, and it is therefore not necessary in all cases to construct it as a separate unit.

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Other types of turbines.

To the other types of turbines, used mostly in continental navies, only brief reference need be made, as they either have already or must soon develop along the general lines indicated. The design of Zoelly turbine originally constructed for land purposes, has apparently been abandoned for marine work; the Zoelly turbines now being fitted to a German cruiser partake much more of the A.E.G.-Curtis type. The Rateau turbine, as is well known, has but a single row of working blades to each wheel, which, of course, tends largely to increase the number of diaphragms. As these are troublesome parts of the construction in any case, it is evidently advantageous to reduce the number as much as possible. The same may be said of the Breguet-De Laval turbine. The Melms and Pfenninger turbine is, of all types, that which most resembles the Parsons machine, consisting solely of drum construction. On the other hand, the system of impulse stages used for the high pressure portion does not appear as free from liability to mechanical troubles as that of the Curtis or the Parsons type.

Turbines working in series on two or more shafts.

This leads to the consideration of the effect on economy of the arrangement of turbines in the ship. This raises not only the question of the number of turbines in an installation, but the number of shafts through which the power is to be utilised for propulsion and the important subject of parallel or series working. In series working there are two alternative arrangements. In the one case both high and low pressure turbines drive the one shaft, while in the other a high-pressure turbine, driving one shaft, exhausts into a low-pressure turbine on another shaft. As is well known, the fuller the range of expansion the higher the economy, especially with the Parsons type. Thus it is usual with four shafts to pass the steam from the high-pressure turbine on the wing shaft to a low-pressure turbine on the adjacent inboard shaft, giving a series working arrangement symmetrical on each side of the centre line. In one or two cases, however, notably on the new Spanish battleships, the practice is being adopted of running all four shafts in series. There is one high-pressure, one intermediate, and two low-pressure turbines, the last mentioned being on the wing shafts. The high-pressure turbine, on the port inboard shaft, exhausts into the intermediate pressure turbine on the starboard inboard shaft, and the steam passes thence to both low-pressure turbines. The inboard shafts have each a high-pressure astern turbine, exhausting respectively into a low-pressure astern turbine within the same casing as the low-pressure ahead turbine. This arrangement has been adopted in the new Transatlantic liner France for the Compagnie Générale Transatlantique. It is probable that the result will be a large reduction in steam consumption at all powers.

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Independent units on each shaft.

In velocity-compounded impulse turbines of the Curtis, the A.E.G. and other types, the usual practice is to fit high-pressure and low-pressure ahead and astern turbines on one shaft, using only two shafts in all. Some German ships have three shafts, each with its independent series of turbines.

Before entering upon a consideration of the relative advantages of the two systems, it is of importance to point out that any type of turbine can be designed for any given ship, and can be arranged at will on any number of shafts for any reasonable number of revolutions; and that the turbines so applied to these shafts, whatever be their type, may be used either as entirely independent units, or the turbines on two or more shafts may work in series. An impression seems to have grown, and is curiously widespread amongst engineers otherwise well informed, that turbines of the impulse wheel type have some inherent quality which renders it desirable to fit them as independent turbines on each shaft; while the turbines of the "drum" or Parsons type are necessarily fitted in series. The truth is that up to the present time only the makers of the latter type have had the right to arrange turbines in series, owing to existing valid patents, and to this fact must undoubtedly be ascribed the high efficiency per ton of weight attained by the last-named type.

The arrangement of turbines in ships.

The whole subject of the arrangement of turbines and shafts is closely interconnected with details of ship design, and with the size, weight and cost of turbines, as well as economy in steam consumption. With the high powers required in cruisers four shafts seem to be the minimum number advisable, since the aggregate power is such as to involve the developing of 15,000 horse-power or more in each turbine unit, at not more than 300 revolutions per minute if the practice of the direct drive is to continue and a fair efficiency is to be attained by machine and propeller.

Limitations in size of engine room.

In such vessels, a considerable length of engine room may be obtained without handicapping the naval architect in arranging other elements in design, although the disposition of the primary armament is now increasing the difficulties. The breadth of the engine room, too, is now often curtailed by the demand for magazines and ammunition passages. It has not been possible to increase the draught of water of these very large ships proportionately to their other dimensions. The height between the inner bottom and the protective deck has remained practically constant since the days of the 30,000 H.P. cruisers of the Drake class, and even earlier. The conditions thus imposed call for turbines of moderate diameter; whilst length may still be a matter of secondary importance. It follows that the turbines will have a

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low peripheral speed and a large number of stages amongst which to divide the pressure drop of the steam. It may become difficult therefore to build high-power turbines of velocity-compounded impulse type in a single cylinder or independent unit, because the low peripheral speed will call for a greater number of wheels than can be supported on a shaft carried on two bearings only. The arrangement for independent turbines therefore would resolve itself into a high-pressure and low-pressure turbine working in tandem on each shaft, making eight turbines in all, with sixteen glands and sixteen main bearings. Although this is by no means a prohibitive number of turbines, being in fact the same as that fitted in the early ships with Parsons machines, such as the Dreadnought and her immediate successors, yet it cannot be regarded as the ideal arrangement, and involves great weight. This arrangement will further suffer from the disadvantage that, at small fractions of full power (and in the case of a 70,000 H.P. cruiser, the cruising power will be a very small fraction of the whole), the already very small quantity of steam will either have to be divided amongst four enormous high-pressure turbines, or two only of the shafts will have to be given steam, leaving two propellers to be dragged through the water.

Independent units *versus* series working on four shafts.

As a compromise between this disadvantageous state of affairs, and a more complete series arrangement, the consumption at cruising speed may be improved by admitting the whole quantity of steam to one high-pressure turbine which would exhaust, not to its own low-pressure turbine, but to the other three high-pressure turbines in parallel. The complications of pipe arrangement and of manœuvring gear are, however, somewhat greater for this palliative than if the system were adopted of fitting on each side of the centre line of the ship a high-pressure turbine driving one shaft and a low-pressure turbine driving another shaft. We may suppose the diameter to remain the same as in the case of the independent turbine arrangement. The high-pressure turbine would then be lengthened by the addition to it of one-half of the reversing turbine, and the low-pressure turbine would be shortened by the subtraction of one-half of the reversing turbine. Of course, the steam passages would require to be doubled, but this would make little difference to the weight; so that a very considerable saving would be effected in the weight of the turbines proper. There would be additional exhaust steam piping, but this in its turn is largely set off by the fact that there are only two manœuvring gears instead of four. Thus instead of four independent shafts there would be practically a twin-screw ship from the manœuvring point of view; four turbine units instead of eight; one-half the number of glands and main bearings, and two instead of four separate condensing

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plants. The economy at low powers would be considerable, because the small quantity of steam then needed would only have to be divided between two high-pressure turbines exhausting into two low-pressure turbines, instead of being divided into four high-pressure turbines to exhaust into four low-pressure turbines, or instead of into one high-pressure turbine exhausting into the other three high-pressure turbines in parallel.

Provision against break-down.

The principal, almost the only, disadvantage of such arrangement appears to be that in the event of one propeller being injured, or of one turbine breaking down, it would be necessary to take some measures before the remaining shaft of the injured pair would be in a condition to drive the ship. This, however, applies to any twin screw or triple screw arrangement. Many marine engineers would perhaps not consider this precaution necessary; but should it be called for it would be easy to arrange the low-pressure turbine to receive direct live steam in case of necessity, while, if that shaft should be *hors de combat*, an arrangement could be fitted enabling the high-pressure turbine to exhaust direct to the condenser. Remarkably fast voyages were performed by the Mauretania, when a screw propeller driven by one of the high-pressure turbines was disabled, and steam was in consequence supplied direct to the low-pressure turbine on the same side. The vessel was in all respects in as good a condition to undertake her service as though she had been fitted with independently driven shafts.

Three *versus* four shafts.

As to cruisers and battleships of less power than those just spoken of—of between 30,000 and 40,000 horse-power—the choice is between three and four shafts in order to bring the power transmitted through each shaft within safe maxima. Three shafts are, generally speaking, inconvenient from the standpoints of subdivision of engine room by bulkheads, of ship manœuvring qualities, of provision against break-downs and of disposition of magazines and gun mountings; but the triple arrangement is still accepted in certain navies which have grown to disregard the above-mentioned disadvantages through long acquaintance with them in reciprocating-engined ships. In channel steamers, where treble screws are found quite satisfactory, less exacting conditions prevail. Independent turbines on three shafts must, of course, be of greater dimensions, either in diameter or length, than those on four shafts for the same power, because of the necessary reductions in the revolutions of the propellers. The turbines therefore become still more difficult to overhaul where the protective deck limits head room. The number of units must remain two per shaft, making six for the whole arrangement. Here, again, the total number of turbines can be reduced to one-half by the use of a single high-

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pressure turbine driving the centre shaft, with two low-pressure turbines in parallel on the wing shafts, which would receive direct steam for manœuvring. The six-turbine arrangement can be improved by letting the wing high-pressure turbines work in series with the centre high-pressure at low powers, though this involves the piercing of bulkheads by exhaust steam pipes.

The series arrangement is less advantageous for three-shaft vessels than for four-shaft, because the main manœuvring station must be in the centre engine-room, and the wing turbines must be manœuvred either from that central engine room at a distance, or special manœuvring gear be fitted in each wing engine-room remote from the main control station. Moreover, the eduction pipes which pierce the bulkhead would in such an installation assume formidable dimensions. As they must be fitted with automatic valves arranged to be closed when live steam is admitted to the low-pressure turbines, the piping and valves would represent a larger weight than those of the four-shaft series arrangement. The virtues of the arrangement may be said to lie in its comparatively small weight, small space, and the small number of turbines required.

Turbine arrangements in small craft.

Second class cruisers, scouts and destroyers involve somewhat independent problems; but, assuming equal over-all efficiency, the weight of turbines will always be somewhere about in inverse ratio to the square root of the number of shafts, and the cubic dimensions of the turbines will, of course, follow the weight very closely. The use of two shafts necessitates either tandem turbines (making four altogether, as in the case of the Mainz), if the diameter is to be kept reasonable, or almost prohibitive diameters, if constructed as a single unit per shaft. Indeed, as the power of such vessels keeps on increasing, it seems probable that a four-shaft arrangement, corresponding to that in larger power ships, will be adopted.

In the case of twin-screw and triple-screw destroyers the difference in the machinery weights is inconsiderable, any saving in the series arrangement being negatived by the increased weight of pipes and valves, which are a heavy item owing to the enormous volume of steam to be dealt with. For twin-screw destroyers a very simple and robust turbine is a desideratum; and as the whole expansion of the steam takes place in a single unit, it is difficult to avoid an excessive number of wheels if the velocity-compounded impulse turbine be used. The best combination would appear to be a drum construction having an impulse initial stage, while for high powers bye-passing may be adopted from this stage to a point further down the turbine, as is provided for in some later Parsons turbines combining partial admission with ordinary reaction blading.

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Questions of cost and facility of repair.

The cost of manufacture and the facility for opening up and repairs should not be neglected in considering this part of our subject. Within reasonable limits the cost of turbines is of course proportionate to their weight when they are of the same type. Turbines of the drum type are, weight for weight, naturally cheaper than turbines of the wheel type with diaphragms. Dimensions principally influence the question of facility for opening up and repairs. Head room is here an important factor, but the actual weight to be lifted is also a consideration. Diaphragms in multi-wheel turbines may be troublesome. The designer, who is anxious to save weight and length, will make his diaphragms as complete discs; but they may involve difficulties for the engineer who has to overhaul a turbine of this description, because he will have to lift out the rotor and draw endways off it wheels and diaphragms alternately until he arrives at the gland of the one he wants to get at. The alternative to this method is to construct diaphragms divided and joined in the horizontal plane, but this involves considerable extra scantling in the diaphragm to resist the differential steam pressure on the two sides of it and the flanges of the horizontal joint. Moreover, it is necessary to arrange the longitudinal clearances so that the upper half of the diaphragm can be lifted up perpendicularly from between the wheels.

Experience with marine turbines of the wheel type is not very extended owing to the small number of applications so far completed. There were mechanical troubles in the American coasting liner Creole, the first fitted in the States with a turbine other than the Parsons type, and finally they were removed. Again, serious troubles have arisen in the A.E.G.-Curtis turbine of the small German cruiser Mainz, of 30,000 shaft horse-power, and much difficulty has been experienced, and much delay caused, in effecting the necessary repairs and renewals, owing to the diaphragms being successively strung on the shaft. The Parsons turbine has had remarkable immunity from accident, and has a notable record in view of the hundreds of vessels fitted with the system. Since the introduction of sharp tipped blades, which are easily abraded should they happen to touch radially, it may be said that blade stripping from this cause is unknown.

The fact should not be neglected, however, that many engineers of great experience are engaged on the design of turbines. Messrs. John Brown & Co., who have taken up the manufacture of the Curtis turbine in this country, are making many experiments, by which improvements have been evolved, and the results of the performances of the cruisers Bristol and Yarmouth will be looked forward to with great interest. Comparisons of the performances of the Mainz will

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ultimately be possible with similar cruisers having Zoelly, Melms-Pfenninger and Parsons turbines. All such comparative tests assist towards the crystallisation of opinion.

Economy of superheating.

As regards the effect on steam economy of superheating the steam there has been little advance lately. In order to ensure absolutely dry steam, as this prevents erosion of the blades, the steam for the Curtis turbine is slightly superheated. The first attempt to use superheated steam in turbine warships was made with the Parsons turbine-engined German cruiser Dresden. This vessel was fitted with an independently-fired superheater of the water-tube boiler type. And in view of opinions sometimes expressed it may be said that no difficulty whatever has been experienced with the turbines in respect of expansion, clearances, or the effect of temperatures acting on the cast iron casings. There should be absolute freedom from any anxiety on these points with the Parsons turbine having an impulse wheel, where the steam is reduced in pressure by one half and an equivalent amount in temperature before it enters the reaction turbine. If, therefore, the problem of the marine superheater can be solved satisfactorily, there is no doubt that superheating will also be adopted for the Parsons turbine. In this matter, as with the continued improvement of vacua, the present attitude is one of careful collation of data yielded by experience.

Internal combustion engines.

This remark also applies to the subject of internal combustion engines. Experience with small powers is increasing and good results are being achieved, even with reversing engines, but we seem still a long way from the supersession of steam as the prime motive power for large ships.

Propeller speed reduction gear.

As regards propeller efficiency, there is less certainty either as to results or as to the efficacy of means to improve them. Too much is being made of the fact that the high speed of rotation essential to the efficiency of the steam turbine is inimical to the attainment of the best results with propellers. The compromise achieved between these two conflicting conditions is very satisfactory in recent ships; but as neither propeller nor turbine is worked under ideal conditions, it is well that engineers should not neglect the subject. Indeed, it has become one of primary importance, and several systems are proposed to enable the steam turbine to run at high speed and the propeller at low speed. Such speed reduction gear may be mechanical, electrical, or hydraulic, and representatives of all three have recently been tested in a practical way, without, however, impressing naval authorities sufficiently to apply any system on a large scale.

Mechanical gearing.

The mechanical system consists, of course, in the introduction of some form of skew gearing. Mr. de Laval, of Stockholm, has used

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such gearing for the past twenty years with entire success. Present-day applications are for larger powers. Mr. Parsons has applied it in a tramp steamer, the Vespasian, of 4350 tons displacement, loaded, purchased by the company for the purpose of establishing the superior economy of turbines against the originally applied 1000 H.P. reciprocating engines, which have been removed. Before this was done the engines were overhauled and careful data taken of speed and of coal and steam consumption on a voyage to Malta with cargo. The only change now is in the propelling machine, boilers and propellers being the same. The propeller runs at a twentieth of the turbine revolutions. Before embarking on this application of the system, the Parsons Company manufactured an experimental gear of 300 H.P. which showed an efficiency of 98½ per cent., whereas with electric transmission an efficiency of 90 to 92 per cent. would be difficult to exceed. The piston machinery of the Vespasian weighed 100 tons, and the new system 75 tons. The speed was increased by one nautical mile per hour on comparative measured mile trials, while the steam consumption, and therefore the coal consumption, was nearly 20 per cent. less. The results in service promise to yield a saving equal to a substantial dividend, and may lead to the adoption of the system to vessels of higher speed than this 10-knot merchantman.

Parsons.

Tests have also been made with a system patented by Rear-Admiral George W. Melville, formerly Chief Engineer of the United States Navy, and Mr. John H. Macalpine. By the use of pinions and skew wheels the speed of a 6000 H.P. engine was reduced from 1500 revolutions per minute at the turbine to 300 revolutions at the propeller shaft, with a loss of only from 1 to 1½ per cent. of the power. In this case pitch wheels, 70 in. in diameter at the pitch line, and 14-in. pinions are used, and the pitch is 1¼ in. with the pitch helices at an angle of 30 deg. with the axis of the shaft. There are two units, the one having right hand helices and the other left hand helices to eliminate end thrust. The pressure on the teeth is not excessive, being only about one-fourth of that in the gear on some motor-cars. On this system, which is being introduced by the Westinghouse Co., a cradle-balanced frame for the pinion is applied. This would seem unnecessary as the pinion will adjust itself automatically, distributing half the tangential push between the right and left -hand teeth on each side. Mr. de Laval has used no such balancing arrangement, nor does Mr. Parsons. If such were necessary, a spring drive, giving wheels and pinions slight rotary elasticity on their shaft, would be preferable. The Westinghouse system is being fitted in a coaling steamer for the United States Navy.

Westinghouse's.

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Föttinger's hydraulic reduction and reversing gear.

An hydraulic system, invented by Dr. Föttinger, has been applied to a tug boat by the well-known Vulcan Co., of Stettin. This gear has the great advantage over the mechanical system that, in addition to reducing speed, it provides a convenient method of reversing the direction of rotation, so that astern turbines need not be fitted. On the same shaft with the steam turbine there is mounted a water turbine pump, by which pressure and velocity are imparted to water, which, passing thence through guide blades, drives a secondary water turbine on the propeller shaft. The secondary turbine has two stages with guide blades between, and is thus compound. The water issuing from the exhaust again passes at once into the primary turbine pump. Thus the water moves in a constant compact flow. In this way it is possible, with good economy, to reduce the propeller shaft speed to one-seventh of the steam turbine speed. A similar arrangement is introduced for reversing; the set of the blades between the primary and secondary water turbines influences the direction of rotation of the latter and therefore of the propeller shaft. This is regarded as a promising application. On a 500 H.P. installation at sea an efficiency of 83 per cent. was realised; with larger plant this would be increased. The mechanism is compact, requires no large water supply as the same water circulates through the turbines over and over again, and the gear can be quickly controlled. On the occasion of the writer's presence at trials, the steam turbine was run at 1600 revolutions and the propeller shaft at about 270 revolutions ahead. The lever for controlling the valve for filling the astern water turbine and emptying the ahead water turbine was thrown over, and within 19 seconds the shaft was running astern at 250 revolutions. The return to full speed ahead was accomplished in even less time. It is claimed that in a torpedo-boat 6·7 per cent. less fore and aft space would be required, and 10 per cent. less weight for turbines and transmitters than with turbines alone, allowance being made for the larger shaft and propeller due to the reduced rate of rotation. On the same basis, the saving of weight in a battleship would, it is assumed, be 17 per cent., and in area of engine-room 23 per cent.

Electrical power transmission and propeller speed reduction.

The electrical transmission system has many advocates, but there are few data from practical application. The idea is to run the turbines, at their most economical speed, generating electricity, which would then be utilised in motors rotating the propeller shaft. The idea seems attractive, but there are difficulties. There would, no doubt, be economy at low powers, as the number of generators in use could be determined to suit the power required; but the efficiency of the motors would diminish at reduced speeds.

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Moreover, complications in motor design are involved in arranging them to rotate the shaft at any desired speed, so much so that the proposed motors are really adapted only for full, half, or quarter speed. Ships manœuvring in line of battle must be capable of the slightest perceptible variation in speed and in the rate of change of speed. There is a sharp difference of opinion as to whether this can be done electrically. Electricians contend that the required variation in propeller revolutions can be got by altering the speed of the generators between the fixed points of full, half, and quarter speeds. There are difficulties in respect of ventilating the electric machinery in a confined engine-room, which may even be closed down in war, while sea-spray, through ventilators, might play havoc with the insulation. This insulating difficulty, however, may be overcome by a system proposed by Mr. Parsons and his assistants, Messrs. Stoney and Law. But it remains to be seen whether the merits outweigh the demerits. There is no reduction in space in the proposed schemes; weights in the engine-room are increased, and little reduction in boiler weights would be justified, since the steam consumption of turbo-generators in land stations is not 5 per cent. less than some of the later marine turbines under the same conditions of steam pressure, vacuum, and superheat, although this difference would be greater were land units as large as marine turbines. Indeed, the turbines of the British scout Swift, of 35¼ knots speed, proved quite as economical as any land set, which now range up to 10,000 horse-power at 1000 revolutions. The transmission, on the other hand, would involve a loss of about 10 per cent. The conclusion come to by the Engineer-in-Chief of the Navy (Admiral Oram, C.B.) is that "the interposition of a dynamo and motor between the engine and its work, involving, when on board ship, considerable liability to accident and derangement of the electrical machines, in addition to present risks, has disadvantages such that the practicability of the details should be beyond question, and the gain by its adoption must be shown to be substantial, before the system could be fitted to any important vessel."

Propeller efficiency.

But without any speed reduction gear between the turbine and the propeller, there are distinct prospects of improved efficiency between the boiler and the propeller. An immense amount of data is being accumulated by the Admiralty and by a few firms as the result of trials of ships with different propellers. The line of most profitable investigation is thus being pointed out, and future progress will probably be more marked. The results of the new propellers on the Mauretania prove that increased efficiency is possible. But it is difficult to determine the exact cause of the improved results,

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There was a change in the number of blades, the new propellers were solid instead of having the blades separate and bolted to the boss, and the shape of the blades was different. Where there are so many variants deduction is dangerous. In order to get adequate pressure per square inch of blade area in association with the small diameter regarded as desirable in view of high rotating speed, a blade of clover-leaf shape has been preferred; but the new propellers of the Mauretania are of the old pear-shaped form. Such a shape, it is contended, is only possible where revolutions, and therefore tip speed, are low. Such conditions may justify the accumulation of blade area towards the periphery; but where there exist limitations on the size of turbines, and therefore on the number of revolutions, other conditions must prevail. The process of trial and error must, however, yield more definite formulæ for propellers in turbine-driven ships. For the present, the fact that a propulsive co-efficient of about 0·6 has been realised in some recent naval ships shows that progress is being made, and that in such vessels there is no real need for speed-reduction gear between the turbine and propeller. Indeed, there is every indication that none of the elements which conduce to the efficiency of warships' speeds is being neglected. On the contrary, there is to-day greater vigilance in detail and a wider general grasp of the comprehensive problem.

ALEX. RICHARDSON.

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CHAPTER VIII.

"The Command of the Adriatic."

The object of this chapter is to throw some light upon the new situation which is arising in the Mediterranean owing to a feeling of doubt and unrest that has been engendered by a certain straining of the good relations which have hitherto existed between Austria-Hungary and Italy. Obscure causes are at work, the direction and ultimate outcome of which are not easy to determine. It is not necessary, however, for the present purpose to analyse very closely the political understanding which has ruled the relations of the two monarchies. As is well known, it was primarily the action of Bismarck in encouraging France to annex Tunis that increased in Italy suspicion of French intentions, and ultimately drove Italy into the Triple Alliance. But, faithful as she has been to her pact with her northern neighbours, Italy has never been quite happy in their friendship. Lissa was not forgotten. The Congress of Berlin had left bitter memories. The Irredentists, to whom the surrender by Austria was not enough, had passionately besought the incorporation of the Italian-speaking districts, South Tyrol, Istria and Trieste, in the Italian Kingdom, and though they have ceased to influence practical politics, have still a living creed. Gradually the good understanding between the two Powers weakened. Italy turned towards France, and the *entente cordiale* strengthened her relations with other friends in the European concert. The changed situation was marked by her attitude at the Algeciras Conference, and it required only the annexation of Bosnia and Herzegovina, and the strengthening of the Austrian position along the Dalmatian coast, to create the situation that exists.

Austria, Italy, and the Triple Alliance.

When, last October, the thirtieth anniversary was celebrated of the signature of that treaty between Austria-Hungary and Germany, which afterwards, by the inclusion of Italy in the compact, brought about the Triple Alliance, the celebration evoked enthusiasm in Berlin and a warmly sympathetic response in Vienna, but it aroused only very modified rapture in Rome. The league between Germany and Austria had passed into the very blood of the people. The war of 1866 was forgotten, and whatever desire there might have been to avenge the disaster of Königgrätz was quenched by the swiftness and completeness of the German success in 1870. As the *Kölnische*

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Zeitung said, "In good times and in evil they have stood together, and if the alliance has more than once influenced the course of international politics, it found its strongest and most decisive scope for action when last year Germany resolutely, and with her full strength, stood ready by the side of Austria-Hungary, and made it possible for her to carry out her policy of expansion without disturbing the peace of Europe." The annexation of the provinces had, in fact, been made possible by the known resolution of Germany to draw the sword if Russia should interfere. But this attitude and the action of Austria-Hungary, while it strengthened the bond between the central Powers, had the inevitable effect of deepening the doubt and suspicion which had entered into the mind of Italy.

Scarcely, indeed, was the celebration of the Triple Alliance forgotten when the Tsar paid a visit to King Humbert at Racconigi, which was the sealing of a new international friendship. It was impossible not to conclude that the meeting marked a sense of deep resentment at the endangering of the interests of both Powers in the Balkan peninsula which resulted from the annexation of the provinces. A suspension of normal relations between Russia and Austria-Hungary had ensued, while Italy, keenly apprehensive of the new situation in the Adriatic, was further withdrawn from friendship with her allies, and urged upon a course of naval and military expansion. The community of Russian and Italian interests in the Balkans, admitted by the late M. de Giers and the Marquis di Rudini, was on this occasion raised into a principle of the policy of the two nations.

It would no doubt be easy to exaggerate the gravity of the situation that has resulted, though some of its consequences will certainly be of great importance. Indeed, next after the development of German naval preparations, which are the dominant factor in the naval and international position of affairs—and in direct relation to them—nothing merits consideration more than the consequences of the growing suspicion and coolness between Austria and Italy, because they promise to affect very seriously the future balance of naval power in the Mediterranean.

The attitude of Germany.

The position of Germany with regard to this matter is ambiguous, and the conduct of her policy demands skilful handling in the Wilhelmstrasse. By her energetic support of the forward policy of Austria she grievously wounded her other ally, and the Italian press at the time was full of bitter recriminations. It was, therefore, necessary to strengthen, if possible, the bonds which had thus been weakened, and there are some indications of the manner in which this attempt was first made. When Admiral Bettòlo succeeded the

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late Admiral Mirabello as Italian Minister of Marine, Admiral von Tirpitz sent cordial telegraphic congratulations to his "colleague and old friend," and Admiral Valois, in the *Deutsche Rundschau*, spoke in the most appreciative terms of the new Minister, and urged him to carry forward the expansion of the Italian Fleet, so as to give to Italy superiority to any possible enemy in the Mediterranean save Great Britain—*nur England ausgenommen*. In the *Neue Militärische Blätter*, Dr. von Grävenitz said that Admiral Bettòlo was the right man for the duties, and would drive the shipbuilding programme through. The more recent visit of the German Imperial Chancellor to Rome, coinciding curiously with a ministerial crisis which removed Admiral Bettòlo from power, is said by the German semi-official press to show that the idea of the Triple Alliance has taken root in Italy in wide circles of the population. Germany would gladly welcome the creation of strong fleets by both her allies if she could be assured of the strength and permanence of the bonds of the Triple Alliance; but she places her greater confidence in Austria-Hungary, and would view few things with less favour than the development of a strong Italian Fleet, if she thought it might become a menace to the policy she is pursuing in the Near East in close understanding with the Dual Monarchy. Dr. von Grävenitz, in the article above referred to, feels, however, no apprehension on this point, and writers like Adolf Wagner, Hans Delbrück, Theodor Schiemann, and Schulze-Gävernitz, view with satisfaction anything that might constitute a counterpoise to our concentrated supremacy in the North Sea and its approaches.

Austrian objects and suspicion of Italy.

As to the strained relations between Austria-Hungary and Italy they have no official recognition, but they are traceable in the suspicious observation which each keeps upon the other, and are translated into action in the increase and massing of military forces, the strengthening of frontier fortresses and naval bases, and the preparation and endeavour to execute naval programmes. They are manifested in the press in the Chauvinistic articles, on the one side, of such papers as the *Preparazione*, and as the *Armee-Zeitung* on the other. A considerable pamphlet literature has been the outcome of the situation. "Wem sind Oesterreich-Ungarns Seeinteressen anvertraut?" demanded one writer in the title of a brochure which harshly assailed the Austro-Hungarian Naval Minister's failure to hasten on the naval expansion of the country. These interests, he thought, were entrusted to weak hands. Herr Max Schloss, in a pamphlet entitled "Oesterreich-Ungarns Wacht sur See," made a most strenuous appeal to his countrymen to bring about the creation of a great fleet, the possession of which he regarded as a matter of life or death to the

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Dual Monarchy. He apprehended that the Italians would establish blockades, seize the Dalmatian Islands, and ravage the coasts, and that Lissa—"the Gibraltar of the Adriatic"—would fall into their hands, adding, with a rather clouded sense of strategy, that the possessor of Lissa would command the Adriatic, which, of course, he could only do with naval forces and not by holding Lissa. But Herr Schloss had no doubt that to build a powerful fleet was the right safeguard, the more so because, in his view, the voice might be the voice of Italy, but the hand would be the hand of England. Herr Anton von Mörl, editor of the *Reichspost*, agreed with Herr Schloss as to the vital importance of a powerful navy to Austria-Hungary. "Tod oder Leben für unsere Kriegsmarine," was the title of a pamphlet in which he subjected its condition to keen and destructive analysis. In Italy several writers also took up the pen, in such pamphlets as "Armate la Marina," and a strong naval propaganda was spread in support of the energetic work of the late Minister of Marine.

The appointment of Admiral Bettòlo, though in some quarters his popularity was afterwards somewhat dimmed by his proposals in regard to the Maritime Conventions, was received with particular satisfaction in Italy, because in command at Venice and as Chief of the Naval Staff, he had been in a special manner identified with the protection of Italian interests in the Adriatic—"Il mare nostro," as D'Annunzio calls that sea which has played so great a part in the life of Italy in every period of her history. He had done much to increase the importance of Venice in relation to the lagoon torpedo station of Marano, which is at a distance of thirty miles only from Trieste, and he promised to add to its value as an Italian naval base. On the occasion of his departure from Venice, he delivered a well-remembered address, which procured for him the name of the "Italian Montecuccoli," wherein he bade his hearers keep their eyes turned eastward, and labour to remove all impediments to the interests of Italy in that direction. The admiral has also attributed great importance to works at Ancona, and further south, at Brindisi, as a base for vessels seeking to bar the passage of the Strait of Otranto.

The situation in the Adriatic.

It is this supremacy in the Adriatic which the Austrians neither can nor will admit. To the Italians these waters are "mare nostro," but in Austria the "Vorherrschaft in der Adria" has become the watchword and standard of those who have agitated for the foundation of a really powerful fleet. The annexation of the Balkan provinces, and, perhaps, further unsatisfied political ambitions in that direction, make the possession of a navy which shall enable the Dual Monarchy to pursue her objects without interference an imperious necessity.

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It is remembered that, in 1848, naval impotence left the whole of the coast unprotected, and enabled the Sardo-Neapolitan Fleet to blockade Trieste. Historians have pointed out that a sufficient fleet, even if inferior, would, in 1859, have rendered the transport of four French Army Corps from Marseilles and Toulon to Genoa impossible, and thus would have rendered the land campaign infinitely more difficult. It was utter naval impotence that left the coasts exposed at that time, and laid Venice, then in Austrian hands, open to blockade. In 1866, it was the vigorous action of Tegethoff that averted a like calamity. Austrian statesmen and seamen are well aware that only sufficient naval forces can give security to the coasts and the coast communications, and enable the Dual Monarchy to exert her will in the Balkan Peninsula or elsewhere. If she should be unable to secure the freedom of the Strait of Otranto, her commerce would be swept from the seas, and her coasts would be open to attack. At present, Dalmatia has only one railway line, which passes through Hungary, and if the concentration of troops is to be made possible, another line, uniting the new provinces with Vienna, is recognised to be essential. Austria must organise such a fleet of battleships, cruisers, destroyers, and submarines that it shall be impossible for any Power to blockade her ports, to attack successfully her trade, or to land troops for the breaking of her communications, or any other purpose of aggression. If Italy should be able to hold the Strait of Otranto, with Brindisi and Taranto as the bases of her vessels operating there, and to establish a blockade of Trieste, Pola, Fiume, and other ports by commanding the Upper Adriatic, Austria would be powerless to resist attack, and disaster could not be averted. The determination of Italy to increase her Fleet is regarded, therefore, with the utmost apprehension. The building of Dreadnoughts, and the great extension being given to the Italian flotilla of destroyers, sea-going torpedo-boats, and submarines, with Venice and Marano as bases for the latter, is regarded as the sign of an imminent danger.

The position of Italy.

Italy, on her part, is not less sensible of the existence of grave national dangers. In contrast to the well-protected coasts of Dalmatia and the annexed provinces, with good harbours and islands sheltering waters which constitute admirable bases for the operations of destroyers, she sees her own long, flat coast-line with no good natural shelter or harbour southward of Venice, between Ancona and the Gulf of Manfredonia; at which places widely-separated spurs of the Appenines run out to the sea. Further south comes Brindisi, on the approach to the Strait of Otranto, where a station for Italian flotillas is being formed, but the whole coast presents little of natural advantage either as the base of naval forces or as presenting facilities

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for local defence. The Italian Army General Staff are well aware that the landing of a strong, hostile force in the region of Rimini and Ravenna, followed by an advance against Bologna and Ferrara, would be a grave military misfortune, especially if another army were disembarked in the neighbourhood of Pescara for an advance against Rome.

Military dangers and preparations.

These considerations caused the last Giolitti cabinet to appoint a parliamentary committee to investigate various questions embodied in the terms of the reference: Whether the existing military organization answered to the requirements of the country; if the organization was economically satisfactory; if the Army could be rapidly concentrated on the frontier; if the frontier was sufficiently fortified; if the armament of the troops was sufficient; if the administration was satisfactory; and if economies could be effected without weakening the Army. The practical response was that the peace strength was to be increased from 205,000 to 225,000, with a promised further increase to 250,000 in relation to the introduction of a period of two years' service, and that for the period 1909–17 an extraordinary credit amounting to £17,000,000 was opened. This provides for the modernizing of land and coast fortifications, the introduction of a new field gun and howitzer, machine gun sections for cavalry, the purchase of horses, additional stores, and the building and enlargement of military establishments. Out of the total nearly £7,500,000 will be devoted to fortifications, and mainly to the strengthening of Verona, Venice, and the defences of the north-east frontier. The frontier forts are to receive eighteen armoured turrets, and Venice will be armed with 11-in. and 12-in. guns, while further to the east and on the frontier a fortified camp will be formed between Udine and the sea. The strength of the troops in the frontier region has been increased, and in relation to the fixed defences Generals Cadorna and Corradini made a survey of the frontier, with special reference to the works at Cadore and Osoppo, the object being to link them together by new defences, so that they may protect the concentration of troops and prevent an enemy breaking through. All the defences on the course of the Isonzo were included in the survey.

Defensive objects of Italy.

These military measures are mentioned here because they indicate the direction from which danger is anticipated, or at least in which protection is most required. In recent naval manœuvres the Italians have practised the embarking and disembarking of troops, and the formation of improvised naval bases, which has caused some surprise and much comment in Austria. But, though they will not surrender their superiority in the Adriatic, their objects are really defensive, notwithstanding such speeches as that of General Asinari di Bernezzo,

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erstwhile commanding the Milan Army Corps, who said that the undelivered lands were still awaiting the work of Italian soldiers—"Poco lontano stanno le terre irredente le quali attendono l'opera vostra." "L'Italia vuol vivere di per sè stessa, non per commiserazione altrui," commented the late Admiral Mirabello, former Minister of Marine, in a speech on the navy estimates in June, 1909. It is true that the Austrians do not view with anything but displeasure the establishment of a torpedo base in the Marano lagoons opposite to Grado, and only some thirty miles from Trieste. They represent it as an offensive measure, but it may just as reasonably be regarded as defensive, flanking any Austrian operations against the Italian coast. There are, if we may believe such papers as the *Preparazione*, many Italians who think that a war with Austria is sooner or later inevitable, and the Government is convinced that the best way to avert such a calamity is to make adequate naval and military preparations.

Rival navies.

The table of comparative strength on the opposite page (which does not include the ships of the new programme) shows that Italian statesmen in the past have maintained a naval strength very greatly superior to that of Austria-Hungary, and indicates that the new competition of armaments has its source in the determination of Austria-Hungary to create a fleet of sixteen Dreadnoughts, with scouts and auxiliary vessels complete.

In this table the old vessels Sicilia, Sardegna, and Re Umberto are included, though in these days they possess little fighting value, in order to show that Italy has always maintained a powerful sea-going navy. An examination of the table will indicate, on the other hand, that the Austro-Hungarian navy has until comparatively recent times been mainly a coast defence force. It is the change in its character that marks and is bringing about the change in the Mediterranean situation. The building of the Habsburgs and Erzherzogs indicated some progress towards a wider conception of the duties of the navy of the Dual Monarchy, though still, in class and armament, the Austrian ships were inferior to the Italian. The vessels of the Franz Ferdinand class, which are not yet completed, are included in the table in order that the significant further advance may be seen, which began to cause alarm in Italy. At length Austria-Hungary was building more powerfully armed ships, designed for larger objects, and a policy of further expansion was foreshadowed. Italy still possessed the advantage, and in the matter of armoured cruisers her superiority was unchallenged, but, unless her position in the Adriatic was to be jeopardised, and she was to live under a constant menace of danger, new efforts were manifestly required. The peril loomed in the future, and when it was seen that the Franz Ferdinands were to

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be the beginning of a fleet of sixteen powerful battleships, ultimately to be Dreadnoughts, the need of a new shipbuilding programme could no longer be denied, and a fresh competition of armaments began.

These considerations caused the Italian Chamber to consent to the additional expenditure that was involved by the construction of Italian naval expansion.

ITALY.				AUSTRIA-HUNGARY.			
—	L'nch'd.	Displacement.	Main Armament.	—	L'nch'd.	Displacement.	Main Armament.
Battleships—				*Battleships—*			
Roma	1907	12,421	4 12-in.	Zrinyi	1910	14,500	4 12-in.
Napoli	1905		12 8-in.	Radetzky	1909		8 9·4-in.
Regina Elena	1904			E. Ferdinand	1908		
Emanuele III.	1904			E. Ferdinand Max	1905	10,433	4 9·4-in.
Ra. Margherita	1901	13,214	4 12-in.	E. Friedrich	1904		12 7·5-in.
Benedetto Brin	1901		4 8-in.	E. Karl	1903		
E. Filiberto	1897	9,645	4 10-in.	Babenberg	1902	8,208	3 9·4-in.
Saint Bon	1897		8 6-in.	Arpád	1901		12 6-in.
Sicilia	1891	13,087	4 13·5-in.	Habsburg	1900		
Sardegna	1890	13,640	8 6-in.	Wien	1898	5,500	4 9·4-in.
Re Umberto	1888	13,673		Budapest	1896		6 6-in.
				Monarch	1895		
= 12 13·5-in., 56 12-in., 8 10-in., 56 8-in., 40 6-in.				= 12 12-in., 57 9·4-in., 36 7·5-in., 54 6-in.			
Armoured Cruisers—				*Armoured Cruisers—*			
Amalfi	1908	9,832	4 10-in.	St. Georg	1903	7,185	2 9·4-in.
San Giorgio	1908		8 7·5-in.				5 7·5-in.
San Marco	1908			Kaiser Karl	1898	6,151	2 9·4-in.
Pisa	1907			M. Theresia	1893	5,187	8 6-in.
Varese	1899	7,249	1 10-in.				
G. Garibaldi	1899		2 8-in.				
F. Ferruccio	1902		14 6-in.				
Carlo Alberto	1896	6,396	12 6-in.				
Vettor Pisani	1895						
Marco Polo	1892	4,511	6 6-in.				
= 19 10-in., 6 8-in., 32 7·5-in., 72 6-in.				= 6 9·4-in., 5 7·5-in., 16 6-in.			
Other Cruisers and Gun vessels—				*Other Cruisers and Gun vessels—*			
16 various	1891–1899	881–2,689	6 in. and smaller guns	11 various	1889–1909	4,000–492	9·4-in. & smaller guns
Destroyers—				*Destroyers—*			
25	1898–1910	—	—	12	1905–1909	383	
1st Class T.b.s.—				*1st Class T.b.s.—*			
36	1888–1909	130–200	—	30	1905–1909	152–197	

ships as powerful as any that were building for or contemplated by other navies. Thus by the law of June 27th, 1909, special annual sums, rising from about £2,100,000 in 1909–10 to £3,200,000 in the three concluding years (1913–14 to 1915–16) covered by the law, were made available for new construction, ordnance, stores, special requirements of coast defence, coal, and other purposes. The total

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sum allotted to new construction, including ordnance, in 1910–11 is, in round figures, £2,200,000, enabling the two Dreadnoughts, Dante Alighieri and Conte di Cavour, and one of the scouts to be continued, and the two other Dreadnoughts, Giulio Cesare and Leonardo da Vinci, and two other scouts to be laid down, besides work upon torpedo craft. The details of the Italian scheme of expansion will be found elsewhere in the *Naval Annual*. Although progress is not so rapid as was anticipated, Italy has taken the lead, and her Dreadnoughts are progressing, while those of Austria-Hungary are not yet begun.

Austrian naval plans.

The increase of the Austrian Fleet has met with some resistance. The scare that is helping to bring it about has been described as "Flottenparoxysmus," those who agitate have been called "Dervishes," and their demands have been spoken of as an appeal to national Chauvinism. But the journalistic and pamphlet excitement is merely the froth on the surface of a strong national movement, which impels the Dual Monarchy to take a larger part in the affairs of the world. It is pointed out that she has too long been content to build small, inferior, and weak vessels of war, which are the armament of a weak Power, whereas she is one of the Great Powers, and claims not only an equal part in the counsels, but also in the weight and influence of the nations. Hence the extension of naval resources, the development of the building and coaling facilities at Trieste, the plan of making of Sebenico on the Dalmatian coast a first-class naval port, the increase of activity in other directions, and, finally, the scheme for building four Dreadnoughts to be completed in 1913 or 1914, and in succeeding years to be joined by three others to replace the Monarchs, then by three to replace the Habsburgs, and so developing until sixteen Dreadnoughts are there to contest with Italy the "command of the Adriatic" and to influence profoundly the naval situation in the Mediterranean.

The resulting Mediterranean situation.

This is the point to which the preceding observations lead. In 1913 or 1914 these Powers will possess eight of the most powerful battleships in the world, as well as great flotillas of destroyers, and to their battleships others at the rate of at least two per annum will be added. Thus, in a few years' time, a situation will have arisen, which other Powers will have to meet. It may be met by a regrouping of international friendships, by the weakening or dissolution of the Triple Alliance, by the counterpoise of other naval forces—those of France, of Turkey, perhaps of Russia, freed from the bar that forbids the passage of the Dardanelles—but it must be met most of all by strong political direction and vigilant naval foresight in Great Britain.

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CHAPTER IX.

The Dominions and Imperial Defence: Their Resources for Naval Shipbuilding and Equipment.

The problem of finding a scheme of naval co-operation for mutual protection and the support of common interests, to which every self-governing portion of the British Empire could give its assent, and in which it would participate, has been a fruitful subject of discussion for just upon a quarter of a century. The solution of this problem has not yet been found, but, by a general concensus of opinion, a nearer approach has now been attained, and it should be of interest to review the steps by which this desirable advance has been accomplished, and to investigate the obstacles that have yet to be surmounted before an entirely satisfactory arrangement can be come to.

The problem of defence.

Imperial Defence, in its naval aspect, presents a two-fold character: it must provide, first, for the maintenance of the command of the sea, or, in other words, for securing the inviolability of the sea communications of the Empire; and, secondly, it must give adequate protection against expeditions organised for raiding coast-wise trade, commercial harbours, and naval bases. It might be supposed that, having made adequate provision for the first duty, the second would be secured, but latter day experiments, like the experience of the ages, have proved that this is not the case. Raiders, like blockade runners, can and will slip through the watching cordon of cruisers and scouts, and although they should not have a long life, may do much damage, not only directly to commerce, but indirectly by the alarm they create. To secure sea supremacy, an overwhelming superiority in naval force is needed, so placed as to be ready to meet and beat the enemy as soon as he attempts to leave his ports. This force must comprise all the component parts of a fleet—battleships, cruisers, and torpedo craft, with their auxiliary vessels. It must be self-contained, ready to move at very short notice, and act upon a pre-arranged plan. To deal with raiders there must be subsidiary forces on the waterways leading to possible objects of attack, so arranged and linked up with the main fleet as to be capable of effective concentration at strategical points, covering the menaced territory or interest. Moreover, as the command of the sea will not

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avert the possibility of predatory raids of cruisers, particularly at the beginning of a war, ports of strategic value need some moderate defence, both fixed and mobile.

A workable solution.

It is obvious that the naval defence of the Empire can be most cheaply and efficiently provided for by a single Imperial Fleet under one control. On the other hand, contributions towards the cost of the Imperial Navy without any voice in Imperial policy are not regarded favourably in all of the Oversea Dominions. Under these conditions a workable plan of naval co-operation would seem to be arrived at if the fleet provided by the taxpayers at home undertook to maintain the inviolability of sea communications by preparing to hold in check, and deal successfully with, the main force of the enemy, thus preventing serious attack on the Oversea Dominions and main trade routes; while the Dominions supplied the subsidiary squadrons for coping with any raid upon their coasts or sea-borne commerce which might reasonably be expected. It is insufficient, however, for the latter purpose to provide local defences unless these are mainly of a mobile nature and have a large range of action. The interests to be protected are too widely distributed for one thing, and, secondly, any organisation for naval defence, if it is to be adequate and complete, must contemplate offensive operations to be assured of decisive results. The subsidiary naval forces must be capable of searching for the enemy and destroying him when found. There are, indubitably, other methods by which the Dominions can assist in the work of Imperial Defence, some of them very important and valuable, but there is no other way than that just described from which can be hoped the most satisfactory and conclusive results.

To the war scares of the seventies of the last century may be traced the earliest indication of the growth of a feeling in the Australasian Colonies that they were insufficiently protected from oversea attack. An apprehensive feeling was aroused which found expression in the Colonial Press and in speeches by prominent Colonists. Generally, the view taken was that local effort should be confined to providing local defence; but there were not wanting those who suggested that if the Old Country would increase the squadron of men-of-war in Australasian waters the Colonists might be willing to pay something towards the additional cost, and perhaps even assist to find the men. So long ago as 1873, an imaginative writer in a New Zealand journal described the exploits of a Russian cruiser at Auckland in order to arouse his fellow citizens to a sense of the injury which might be inflicted upon their unprotected city by a raid. The moral drawn by the editor of the *Daily Southern Cross*, in his issue of

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February 18, 1873, was the necessity for a larger squadron of ships being placed on the Australasian Station so that the Colonies and their shipping should be completely protected.

Beginning of Colonial effort.

Even at an earlier date, and before the Dominion had come into being, the Canadian Colonists had set on foot a project for the establishment of a naval volunteer force, and the resources of Canada and Newfoundland for the supply of a naval reserve had not been overlooked. But the Canadian authorities, regarding land defence as more important, set to work to create a local militia organisation, and did a great deal to raise the efficiency of their troops; thus schemes for naval defence languished.

Mills Committee, 1861.

The idea of combination for the mutual protection of Imperial interests, though in the air, had not in the seventies taken on material shape. It was significant, however, that, in 1861, a committee was convened at the suggestion of Mr. Arthur Mills, M.P., "to inquire and report whether any and what alterations may be advantageously adopted in regard to the defence of British Dependencies; and the proportion of cost of such defences as now defrayed from Imperial and Colonial funds respectively." Although no action appears to have been taken on its recommendations, this committee affirmed the principle that the defence of distant Colonial possessions mainly depended on the Navy, and advised, therefore, against the multiplication of fortified places in such possessions. Mr. Gladstone, who was a witness, expressed his conviction "that so long as England has supremacy at sea, her Colonial Empire is virtually safe." Nevertheless, the potential naval and military strength of the Colonies, and its value in connection with the protection of the Empire as a whole, was far from being generally realised by publicists. It was even held by some military authorities that the Empire was too large for a single scheme of defence.

Australian harbour defence.

Another scare in 1878 so alarmed the Australian Colonists that the provision of coast defences was then taken seriously in hand, and they began to make efforts for the protection of their harbours and coasts. Sir William Jervois formulated a plan of which the leading principle was that while the Imperial Navy undertook the protection of trade afloat, the Colonists should at their own cost provide the local forces, forts, and mobile adjuncts for the protection of their principal cities and ports. Batteries were raised on the assumption that the attack would come from raiding cruisers for the purpose of levying contributions in money and kind. Flotillas of ships and small craft were in some instances provided to add to the security of the ports against a casual raid. There were as yet no large aspirations towards a sea-going Navy.

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Colonial Naval Volunteers suggested.

It was, however, at about this time that a change came over opinion at home, mainly owing to the efforts of a few naval officers and other gentlemen, who were interested in the Navy and in Colonial affairs. Lord Brassey, in a lecture delivered at the Royal Colonial Institute in June, 1878, after pointing out that several of the Australian Colonies had provided themselves with local defence, urged the necessity for the provision of a Colonial Naval Volunteer force. His view was that the Imperial and Colonial Governments should combine to create a fleet of sea-going ships which should be kept in reserve in the harbours on the Australasian Station, and manned by these volunteers in time of war. He quoted the opinion of a Sydney paper to the effect that it would cost the Colonies no more to have their naval defence under Imperial than under local control, "while they would get much more for their money in the shape of security." After reproducing the arguments of Admiral Colomb, Sir Julius Vogel, and other writers in favour of a co-operation of the United Kingdom with the Colonies in measures of mutual self-defence, Lord Brassey advocated an inquiry by a Royal Commission, as a necessary preliminary and preparative measure to the adoption of a complete and practicable scheme for the protection of the British Empire.

Carnarvon Commission, 1879.

In the following year, Lord Beaconsfield appointed a Royal Commission, of which Lord Carnarvon was president, "to inquire into the defence of British possessions and commerce abroad." For the first time it was officially recognised that some kind of organisation of the various systems of defence was needed if the communications with the distant parts of the Empire were to be maintained in time of war. A mass of information was collected by the Commission, and brought together in three reports between 1879 and 1882. Among other matters referred to in these reports may be mentioned the fortification of the coaling-stations, the importance of the Cape of Good Hope in any system of trade protection, the need for the Colonies to undertake their own local defence, and the necessity for increasing the strength of the Navy. Full recognition was made of the potential strength of the Dominions overseas, and the advantages to the Empire which would accrue from the "convenience of ports" to the maintenance of sea supremacy.

Inter-Colonial Conference, 1881.

At an Inter-Colonial Conference held at Sydney in 1881, a movement, having for its object a more effective protection of the Australasian oversea trade, seems to have first taken definite shape. At this conference a resolution was passed affirming the propriety of the Colonists undertaking the fortification and land defence of their ports, but suggesting that the naval defence of the Colonies, "con-

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sidering the large Imperial interests involved," should continue to be at the exclusive charge of the Imperial Government, and that the Australasian Squadron should be increased. The Home Government of that day did not regard this suggestion with entire satisfaction, and made little or no attempt to initiate joint action in connection with local defence. Each Colony went to work independently, with the result that the return for their defensive investments continued to be of a very inadequate character.

Tryon's negotiations begun, 1884.

In 1883 Lord Brassey again called attention to the circumstance that nothing had yet been done towards the creation of "those centres of naval power" which would provide the most effective means of affording protection to the trade in Colonial waters. The movement for a better organisation of naval defence was, however, consistently pressed, and made good headway. The possibility of an enemy's squadron eluding the vigilance of an Imperial fleet and harassing commerce was the subject of much discussion in the Colonial press. It presently led to a correspondence between the Admiralty, the Commander-in-Chief of the Australasian Squadron, and the Colonial authorities. A scheme for the increase of the squadron was eventually drawn up at home, and sent out to Sir George Tryon as a basis of negotiations with the Colonial Governments. It is clear, then, that, although no definite arrangement was come to until later, the initiative came from the Colonists, and that it was due as much to themselves as to anyone that the matter was put upon a better footing.

At this time, the difficulties of reconciling conflicting interests seemed to be almost insuperable. Narrow views prevailed, coloured by local conditions and circumstances. Already, too, there were those who demanded a voice in the policy of the Empire, and asked why they should assist in defraying the cost of a war while they had no control over the diplomacy which led to it, and possibly no interest in supporting it.

Penjdeh incident, 1885.

Then came the war scare of 1885, arising out of an incident on the Afghan frontier. Urgent requests for advice arrived from the Colonies, proposals for carrying out the Carnarvon Commission's recommendations were made, and a general feeling of uneasiness on the subject of defence prevailed. It was in this year that a Colonial Defence Committee was established to advise the Cabinet, and it may be said that out of this body, and a recognition of the usefulness of its labours, arose the institution now known as the Committee of Imperial Defence. It was in 1885, also, that the first Colonial contingent of troops was despatched to Suakin to fight side by side with British troops. This was at once a recognition of the interdependence

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of Great Britain and her Colonies and a display of patriotism full of hope for the future.

First Colonial Conference, 1887.

Two years later, as a result of the negotiations conducted by Sir G. Tryon between the Admiralty and the Governments of the Australian Colonies and New Zealand, an agreement was arrived at by which the Colonists hired, as it were, a force of seven ships as an addition to the Australasian Squadron, the local idea being that these ships would protect the floating trade in Colonial waters against any small raid if the Imperial vessels were called away. The Admiralty proposals, after much discussion, were agreed to with some modification, at the first Colonial Conference held in 1887, and in the paper on the subject submitted to the representatives of the Colonies, the following statement indicates the purpose of the Government:—

"We do not regard this question in the light of a mere bargain between the Mother Country and the Colonies, but as the starting-point of a new policy—the first step towards a federation for defence, which will not only add strength to the Empire, but tend to bind its members in closer union."

First Australasian naval agreement, 1887.

The agreement was ratified by the Imperial Defence Act of 1888. It was to last for a period of ten years, and at its termination the vessels added to the squadron were to remain the property of the Imperial Government, while it was further stipulated that should such emergency arise, as in the opinion of the naval commander-in-chief might render it necessary to remove the ships beyond the limits of the Australian Station, this was only to be done with the consent of the Colonial Governments.

Thus the principle of the localisation of naval force was admitted, an arrangement which cannot be logically defended on purely strategical grounds. Nothing can be clearer than that the dissipation of naval force leads to defeat, or that in concentration and co-ordination of effort lies the secret of success.

Australian aspirations towards local fleet.

Since 1887, many schemes for mutual co-operation for defence have been evolved, and as regards all the self-governing Colonies temporary arrangements or agreements towards this object have been reached. A general desire to take part in national preparations against hostilities has been manifest and to arrive at a mutually satisfactory settlement of the problem. The notion that the Colonies were the property of the Mother Country, and therefore entitled to protection at the cost of the owners, has no longer obtained. The Oversea Dominions, acknowledged to be integral parts of the Empire, admitted the obligation to contribute to the maintenance of its resources, its prestige, and its stability, and while the Mother Country still bore by far the larger share of the burden of defence, each division

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of the Empire in some degree assisted to relieve her. That the contributions were no larger was undoubtedly due to the imperfect nature of the control which the Colonial Governments possessed over the expenditure of the funds they advanced, and this circumstance operated most strongly in the case of Canada. Again, it was true that the aspiration of those Australians, who looked forward to the possession of a Fleet of their own, were not advanced by the agreement of 1887, and this section of the Colonists bemoaned in the local press the fact that, at the end of the term, Australia would be left without a ship of her own, and perhaps without a trained officer or man, despite an expenditure which might have been used to form the nucleus of a navy. Nevertheless, whatever may have been the motives of those who promoted the first Australasian agreement, it was manifestly a recognition of the principle that the foundations of Imperial Defence rest upon maritime strength, and that a union of all parts of the Empire for defence would enormously increase that strength. Thus the question whether a fuller co-operation could not be brought about was bound to come to the front again.

Naval Defence Act, 1889.

The Naval Defence Act of 1889, following upon the results of the conference of 1887, and other measures taken about the same date to increase the sea strength of the nation, while they placed its defences on a vastly improved footing, and revived the public interest in the Fleet, also restored confidence in the Colonies, and tended to the removal of many misunderstandings.

Colonial Conference, 1897.

The principles which should apply to the defence of the Empire, and the duties which the Imperial Navy would be prepared to perform, were clearly laid down about this time in a Memorandum drawn up by the Colonial Defence Committee. The maintenance of sea supremacy as the determining factor in the defensive policy of the Empire was recognised fully. The responsibilities of the Colonies in the matter were also defined, and much was accomplished in the direction of bringing about a wider realisation of Imperial requirements. At the Colonial Conference of 1897, the acceptance of a resolution in favour of a federal union of all colonies geographically connected indicated a further advance towards the solution of the problem. An immediate result of the discussion at this Conference was a contribution from the Cape Colony, which passed an act in the following year for the appropriation of a sum of £30,000 a year towards the cost of the Imperial Navy. Natal and Newfoundland also made voluntary contributions for the same object, either in cash or its equivalent. Canada maintained her independent position, holding that her willingness to assist could be shown in other ways less likely to entrench upon her cherished rights and privileges.

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Further Colonial contributions.

Then came the war in South Africa, when the Canadian contingents which came to the help of the Empire fully proved that it was not merely a regard for local interests which had caused the people of the Dominion to abstain from recognising in the same way as other self-governing Colonies their obligations to the Empire.

In 1901, the Commonwealth of Australia came into existence, and thus in her case the aspiration expressed at the Conference four years before was accomplished. The question of her co-operation in Imperial defence at once assumed a different phase. The contingents sent by the various States or separate Colonies of Australia had gained experience and knowledge in South Africa and China. The return of the seasoned soldiers and seamen led to the active resumption of the movement for creating local organisations for protection, but at first it affected the land forces rather than naval policy.

Colonial Conference, 1902.

Advantage was taken, in 1902, of the presence in London of the Prime Ministers of the self-governing Colonies in connection with the Coronation, to hold another Conference, at which naval defence was discussed. As a result of this Conference the contribution of Australia was increased to £200,000 a year, and that of New Zealand to £40,000 a year, both these sums to go towards the cost of an improved Australasian Squadron, and the establishment of a branch of the Royal Naval Reserve. The contribution of Cape Colony was raised to £50,000 a year, and that of Natal from £12,000 to £35,000 a year, both for the general maintenance of the Navy. Newfoundland offered to contribute £3000 a year towards the maintenance of a branch of the Royal Naval Reserve, and a capital sum of £1800 for fitting up and preparing a drill ship. It is noteworthy that in spite of the strong feeling in Australia, referred to above, Sir John Forrest, then Minister of State for the Commonwealth Defence, stated in the Memorandum which he submitted for consideration that he was not prepared to recommend under existing conditions the establishment of an Australian Navy. He said: "Even if it were established, I am afraid it would not be very efficient, for besides the enormous cost of replacing the Fleet from time to time with more modern ships there would be no change for the officers and crews, who would go on year after year in the same ships, subject to the same influences, and, I fear, with deteriorating effects."

Forrest on a local Australian Fleet.

Laurier on Canadian views.

It was at this Conference that Sir Wilfred Laurier informed the Admiralty that the Dominion of Canada was contemplating the establishment of a local naval force in its own waters.

The Parliaments of the Commonwealth of Australia and the Dominion of New Zealand passed Acts in 1903 providing for the payment of the contributions above mentioned, and ratifying the agree-

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ment of 1902. The Cape and Natal similarly passed Acts ratifying their contributions towards the general maintenance of the Navy. The Newfoundland contribution has been annually voted by its Legislature. In 1904 the Canadian Dominion acquired the Canada, as a fishery protection vessel and for the training of the Naval Militia, and in the following year an offer was made to take over the cost of maintaining the fortified dockyards at Halifax and Esquimalt.

Creswell's scheme for local Australian force, 1906.

But the Australians were far from being satisfied with the agreement made in 1902, and two years later were agitating for its abrogation. The Prime Minister of the Commonwealth in April, 1906, consequently raised the whole question of the agreement, putting forward a new suggestion with regard to the subsidy. At the same time, a scheme of local defence was drawn up by Captain Creswell, the Director of the Commonwealth Naval Forces, his proposals contemplating the provision of a separate navy. In reply, the Admiralty submitted to the Commonwealth authorities a general scheme of defence for Australia, prepared by the Committee of Imperial Defence, in which the proposal for a local Australian Fleet was not commended. This scheme again was adversely criticised by a committee of Australian naval officers convened to report upon it. Among the resolutions unanimously agreed to by the Committee was the following:—

> In view of Australia's geographical situation, and our distance from the Empire's base, and having regard to our conditions, general, strategic and other, we are of opinion that a naval force raised and trained in Australia, and provision for the manufacture of all war *matériel*, are of first importance to our present security and vital to our future.

At the same time, New Zealand put forward alternative proposals, and some correspondence took place in regard to the agreement with the Cape and Natal.

Colonial Conference, 1907.

At the Colonial Conference in 1907 the subject was again under discussion, and the representatives of the Dominions conferred with the Admiralty with a view to arriving at a more satisfactory arrangement. The result was announced at a meeting held in May of that year by Lord Tweedmouth. The suggestion, so far as the Australian Commonwealth was concerned, was to determine the agreement of 1902, and for Australia to start her own local defence force. New Zealand was agreeable to end the tripartite agreement, but was prepared to go on paying her subsidy, and in return to be provided with some local torpedo defence and possibly a training ship for volunteers. The Cape and Natal desired to have their naval force described as a division of the Royal Naval Volunteer Reserve, and they wished also for a training ship in which their volunteers could exercise. So far as Canada was concerned, it was pointed out that

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she now protected her fisheries by her own cruisers, that she had relieved the Imperial Government of the expense of maintaining the strategic points at the Harbours of Halifax and Esquimalt, and that she had recently voted a large sum of money for the purpose of purchasing another fishery protection cruiser, to be used on the Pacific coast, as well as undertaking the local surveying work. Practically all these proposals were agreed to, but in the meantime it was decided that the Australasian Squadron, as it then existed, should not be removed until the new arrangement could be carried out.

Germany's naval advance, 1909.

This was the condition of affairs in regard to Imperial Defence when, on March 16th, 1909, statements were made about the naval strength and resources of Germany by the Prime Minister and the First Lord of the Admiralty on the introduction of the Navy Estimates for 1909–10. The gravity of the international situation was made clear in a speech by Sir Edward Grey, in a debate on the Vote of Censure, brought forward by the Opposition. The question of Imperial Defence was thus raised in a most acute form, and, on March 22nd, the Government of New Zealand telegraphed an offer to bear the cost of the immediate construction of a battleship of the latest type, and a second of the same type if necessary. Seven days later the Canadian House of Commons passed a resolution recognising the duty of Canada, as the country increased in numbers and wealth, to assume in a larger measure the responsibilities of national defence, and approving of any necessary expenditure designed to promote the speedy organisation of a Canadian naval service in co-operation with, and in close relation to, the Imperial Navy. On April 15th, Mr. Fisher, the Prime Minister of the Australian Government, telegraphed that, whereas all the British Dominions ought to share in the burden of maintaining the permanent naval supremacy of the Empire, so far as Australia was concerned, this object would be best attained by the encouragement of naval development in that country. A later telegram sent by Mr. Deakin on succeeding Mr. Fisher as Prime Minister, offered the Empire an Australian Dreadnought, or such addition to its naval strength as may be determined after consultation in London. These offers of assistance were gratefully accepted by the Imperial Government, and it was decided to invite the defence ministers of the four Dominions and the Cape Colonies to attend a conference to discuss the general question of the defence of the Empire, with special reference to the Canadian resolution and to the proposals from New Zealand and Australia.

Dominion offers of naval help.

Imperial Press Conference, 1909.

This important conference was held in July and August of last year, and as a fitting prelude a conference also took place of the representatives of the press of the Empire, at which the question of

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mutual defence was discussed, with many gratifying indications of the determination of the Dominions overseas to assist in the maintenance of the sea supremacy of the Empire. From the speeches of the Colonial pressmen, it was manifest that they realised that the time might come when the Mother Country alone could ill provide and maintain a sufficient naval force, and that if it should not prove sufficient for Imperial needs, the Colonies would suffer equally with Great Britain. But as Mr. McKenna said, "They must help how and when they decide it best," and Lord Esher added the advice, "by developing individually as centres of naval strength and developing in such a way as makes for the closest possible co-ordination between their navies and that of the Old Country."

Result of Imperial Conference, 1909.

An entirely novel note was struck on this occasion in the discussions on naval defence which took place between the representatives of the Dominions and the Admiralty. For the first time, a sympathetic desire was shown by the Home authorities to bring about such an arrangement as might co-ordinate the aspirations of the Colonists with the strategical needs of the situation. On all sides, a determination was apparent to harmonise differences, and arrive at an understanding upon which definite action could be taken for the provision of such maritime defence as should give a sense of security in peace time and prove effective help in time of war. The result of the Imperial Conference, so far as it related to naval affairs, was thus stated in the House of Commons by Mr. Asquith in August:—

Naval defence was discussed at meetings of the Conference held at the Foreign Office on the 3rd, 5th and 6th August. The Admiralty Memorandum, which had been circulated to the Dominion representatives, formed the basis of the preliminary conferences.

The alternative methods which might be adopted by Dominion Governments in co-operating in Imperial Naval Defence were discussed. New Zealand preferred to adhere to her present policy of contribution; Canada and Australia preferred to lay the foundation of fleets of their own. It was recognised that in building up a fleet a number of conditions should be conformed to. The fleet must be of a certain size, in order to offer a permanent career to the officers and men engaged in the Service; the *personnel* should be trained and disciplined under regulations similar to those established in the Royal Navy, in order to allow of both interchange and union between the British and the Dominion Services; and with the same object, the standard of vessels and armaments should be uniform.

A remodelling of the squadrons maintained in Far Eastern waters was considered on the basis of establishing a Pacific fleet, to consist of three units in the East Indies, Australia, and China seas, each comprising, with some variations, a large armoured cruiser of the new Indomitable type, three second-class cruisers of the Bristol type, six destroyers of the River class, and three submarines of C class.

The generous offer, first of New Zealand and then of the Commonwealth Government, to contribute to Imperial naval defence by the gift each of a battleship was accepted with the substitution of cruisers of the new Indomitable type or battleships —these two ships to be maintained one on the China and one on the Australian station.

Separate meetings took place at the Admiralty with the representatives of Canada, Australia, and New Zealand, and general statements were agreed to in each case for further consideration by their respective Governments.

As regards Australia, the suggested arrangement is that with some temporary

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assistance from Imperial funds the Commonwealth Government should provide and maintain the Australian unit of the Pacific Fleet.

The contribution of the New Zealand Government would be applied towards the maintenance of the China unit, of which some of the smaller vessels would have New Zealand waters as their headquarters. The New Zealand armoured cruiser would be stationed in China waters.

As regards Canada, it was considered that her double seaboard rendered the provision of a fleet unit of the same kind unsuitable for the present. It was proposed, according to the amount of money that might be available, that Canada should make a start with cruisers of the Bristol class and destroyers of an improved River class—a part to be stationed on the Atlantic seaboard and a part on the Pacific.

In accordance with an arrangement already made, the Canadian Government would undertake the maintenance of the dockyards at Halifax and Esquimalt, and it was a part of the arrangement proposed with the Australian representatives that the Commonwealth Government should eventually undertake the maintenance of the dockyard at Sydney.

South Africa and Newfoundland.

No further agreement was made with the representatives of the South African Colonies, owing to the position in which they were placed, pending the election of the Union Parliament of South Africa. In the meanwhile, the obligation was recognised for the continuance of the existing contributions to the Navy paid by the Colonies of the Cape of Good Hope and Natal. Similarly, the representative of the Dominion of Newfoundland indicated that the existing provision for a Naval Reserve would be continued.

The problem simplified.

The problem, which it was thought would grow more complex, thus appeared suddenly to have been simplified. The solution, instead of getting further away, actually presented fewer elements of difficulty, and was brought hopefully nearer. Every new invention and discovery, such as wireless and submarines, and possibly even the conquest of the air, should be of assistance to the stronger Power, if that Power will take advantage while it may. How much more advantageous, then, to a number of Powers, severally and mutually interested in the maintenance of their rights, the preservation of their communications intact, and the prevention of aggression from any quarter.

The spontaneous offers of the Dominions were to materialise in the shape of armoured cruisers, which would considerably strengthen the Fleet for the protection of commerce and coasts within the Eastern and Pacific waters. The Dominions, if they so decided, were to build their own ships, in their own yards; to train their own men, in their own ships; and to establish and equip centres of naval strength for the refit and repair of the Fleet.

A new departure, 1910.

Local squadrons, having a separate or isolated existence, could never attain to the requisite standard of efficiency. Such squadrons would be a source of weakness, and not of strength. But squadrons or groups of ships provided locally, manned locally, and using local bases; ships useful for offence and of sufficient range of action to protect the local waterways—these groups linked up one with another,

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and with the Imperial Fleet, would in a large measure fulfil the strategical requirements, and at the same time satisfy the natural wishes of the children of the Empire oversea.

One discipline, one organisation, one flag.

On the horizon of the future, we may picture a fleet in which are representative ships from Australia, New Zealand, perhaps South Africa, and possibly India, as well as from the Old Country—a fleet partly Imperial and partly Dominion-owned, but with one discipline, one organisation, and one flag; a fleet of eight or ten cruising battleships, with their auxiliaries, which would make periodical visits to the ports of each portion of the Empire represented in its composition. There is no reason why such a fleet might not come into being during the next four or five years if the Dominions were willing that it should.

In the provision of such a fleet, the important point immediately raised is the ability or otherwise of any portion of the oversea Empire to supply its own unit from its own resources.

Limited value of torpedo craft.

The Admiralty recognise that although a scheme limited to torpedo craft would not, in itself, be a good means of gradually developing a self-containing fleet capable of both offence and defence, yet, under certain conditions, the establishment of local defence flotillas consisting of torpedo craft and submarines might be of assistance in time of war to the operations of the fleet, although such flotillas cannot co-operate on the high seas in the wider duties of the protection of trade and the prevention of attacks from hostile cruisers and squadrons. In each fleet unit, therefore, are a certain number of small cruisers and destroyers. The armoured cruisers, which are an essential part of each Pacific Fleet unit, must be built in the Old Country, but if the Dominions are to undertake shipbuilding and the manufacture of armaments and warlike stores, it is with these smaller craft they should make a beginning.

Canada's Navy Bill, 1910.

In the Canadian House of Commons a Navy Bill was introduced on January 12 of this year, and after discussion read a first time. In introducing the bill, Sir Wilfred Laurier, the Premier, said it was proposed to start in a modest way with the nucleus of a navy. The squadron it was proposed to create would consist of four ships of the Bristol type, one of the Boadicea type, and six destroyers. The cost to Canada of these vessels would be £2,338,000, and if the vessels were constructed in the Dominion this figure would be increased by 22 per cent. It was intended to begin building in Canada as soon as possible. The Bill was finally accepted after a prolonged debate by 119 votes to 78, on March 11. In the meantime, the Canadian Government had made proposals to the Home authorities for the purchase of the Niobe and Rainbow, two cruisers, the former to be

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stationed at Halifax, and the latter at Esquimalt for training the *personnel* for the new vessels. The Niobe, it is understood, will be considered as a substitute for the vessel of the Boadicea class. She is of 11,000 tons displacement, and was up to the early months of the present year in commission as a nucleus crew ship in the Home Fleet. This will leave ten ships to be built, and from Sir Wilfred Laurier's statement in January it seems that British shipbuilding firms will be asked to assist in the extension and equipment of existing yards in which these vessels are to be constructed.

Australian programme of construction.

The Australian unit will consist of an armoured cruiser, three unarmoured cruisers of the Bristol class, six destroyers and three submarines. Three of the destroyers were put in hand before the arrangement made last year had been entered into. Indeed, the joint tender of Messrs. Denny, of Dumbarton, and the Fairfield Shipbuilding Company, for the construction of the three destroyers was accepted in March, 1909. These three vessels are approaching completion. One, the Parramatta, was launched at Govan on February 9, and the others have since been put into the water. The third destroyer, the Warrego, is to be taken to pieces when built and shipped to Australia, where her parts will be reassembled, and the vessel completed at the Government dockyard at Cockatoo Island. The other boats, the Parramatta and the Yarra, are to leave England in September and steam to their destination. The Commonwealth Government have asked the Admiralty to supervise the building of the cruisers in this country, but it seems uncertain whether an attempt may not be made to build the second three destroyers in Australia.

New Zealand unit.

The New Zealand unit, like that of Australia, contains an armoured cruiser, and with this vessel are associated two smaller cruisers, three destroyers, and two submarines. The only ship of this unit to be paid for directly by New Zealand is the armoured cruiser, the contribution of the Dominion being used in the first place to pay the difference in the rates of pay to the New Zealanders in the crews of the ships above what would be paid under the ordinary British rate, and if any balance remain over, this is to be at the disposal of the Admiralty.

Resources for Naval Construction.

Essential points of enquiry.

The decision on the part of the Dominion authorities to undertake warship building operations raises the very important question as to how far their resources render them capable at present of engaging in such work. With a view to obtaining information on this subject

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that should be at once accurate and trustworthy, and as comprehensive as possible, assistance was asked for from the Governments of the Dominions in the collection and supply of the necessary facts. The essential points which appeared to call for consideration included, first, the extent and character of the raw materials in each colony; secondly, the existing plant for the production and manufacture of articles to be used in ship construction and the manufacture of armour and armament; thirdly, the number and capacity of the shipyards, machine shops, etc., actually in working, with their facilities for future development; and, fourthly, the supply of the necessary labour, skilled and otherwise. To questions on these subjects the respective governments responded in a most generous manner, and in addition a great deal of information was obtained from other sources, particularly from gentlemen who kindly interested themselves in the matter.* It is from the information thus obtained that the following particulars have been compiled.

CANADA.

Canadian raw products.

From the voluminous reports issued by the Canadian Department of Mines, it is manifest that in regard to the native provision of raw materials needed for warship building and equipment the Dominion is not lacking in any important respect. Wood, coal, manganese and other iron ores, nickel, and crude oil are present in large quantities, widely distributed under favourable conditions for use and working, and as a rule within easy reach of transportation.

Timber.

As to timber, the only wood of any consequence produced in Nova Scotia is spruce and birch. The country is studded with forests of spruce, and about 50,000,000 superficial feet are annually exported from the provinces. Maple, oak, elm, and pine come from the provinces of Ontario and Quebec, and red fir and cedar from British Columbia. Oak, elm, and yellow pine are imported into the ports of Halifax, Sydney, and elsewhere, principally from Georgia and Florida.

Coal.

Coal is found in Nova Scotia, Alberta, and British Columbia. The yearly output in the province of Nova Scotia is about 5,500,000 tons. The largest shippers are the Dominion Coal Company, with an output of over 3,000,000 tons a year. About 75 per cent. of this quantity is shipped from their piers at Upper Sydney Harbour in

* Thanks are specially due to Rear-Admiral C. E. Kingsmill, Mr. C. F. Hamilton, Mr. Louis Simpson, Dr. Eugene Haanel, Mr. H. F. Brynest, Secretary of the Sydney Century Club, Mr. J. C. MacGregor, President of Messrs. J. W. Carmichael and Co., Captain R. Muirhead Collins, C.M.G., Engineer-Commander W. Clarkson, Professor J. H. Biles, the officials of the Departments, Defence, Mining, Agriculture, etc., of the Colonial Governments, and the Agents-General in London.

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steamers of from 5000 to 9000 tons capacity, and a smaller quantity from Louisbourg. The next largest company is the Nova Scotia Steel and Coal Company, which has an output of about 800,000 tons a year, and it is expected that this year the output will be over 1,000,000 tons. Their coal is shipped at North Sydney in steamers of about the same size as those of the Dominion Company. The Acadia Coal Company, at Stellarton, in Pictou County, have an output of about 250,000 tons, the bulk of which is transported by rail, but they annually send to the St. Lawrence about 70,000 tons, which is loaded on steamers at their docks in Pictou Harbour. The Intercolonial Coal Mining Company have their mines at Westville, and their output is about 250,000 tons. Like the Acadia Company, they ship from Pictou Harbour in the summer, but as this harbour is frozen from the middle of December to the 1st of April, the remainder is sent during the winter months by rail to Halifax, about 100 miles distant. The Cumberland Railway and Coal Company has mines at Springhill, about 125 miles north of Halifax. This Company also produces about 250,000 tons per year, a large portion of which is sent by rail and a smaller quantity from Pasboro by steamers. There are several other companies in Nova Scotia, and on the Pacific side coal mining is among the more important industries of British Columbia. Not only at Nanimo, in Vancouver Island, but on the mainland, coal areas have been discovered and mines have been opened up. The companies with the largest output are the Wellington Colliery Company and the Western Fuel Company, on Vancouver Island, and these concerns are equipped to turn out about 5400 tons daily. The Crowsnest Pass Coal Company, in the province of British Columbia, is another large producer, with a somewhat similar output, and there are several companies which, if of less capacity now, are being rapidly developed. In Alberta and Saskatchewan there are immense coal-bearing areas producing several varieties of coal, and many mines are being operated.

Iron ore.

Iron ore is worked in Newfoundland, New Brunswick, Quebec, Ontario and British Columbia. There exist very large deposits of ore in Quebec, which will be of use when put through the electric reduction furnace. Iron also exists within a few miles of Sydney, but these areas have not been developed, nor has their economic value been demonstrated. The facilities for obtaining ore at a cheap cost of water transportation from the well-known Wabana Mines at Newfoundland have been so great that the Cape Breton areas have not received the attention that they otherwise would have done. The ores used by the Dominion Iron and Steel Company and the Nova Scotia Steel and Coal Company at Sydney are obtained from the

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Wabana Mines on Belle Island, in Conception Bay, Newfoundland. It has been estimated that there are quantities of ore amounting to several hundred million tons on this island, and both these companies are interested in its ownership. The distance from the island to Sydney is about 500 miles, and the ore is conveyed in steamers carrying from 7000 to 9000 tons. A company has also been formed to develop an iron mine in Western Nova Scotia, at Torbrook. The iron obtained from Wabana is a red hematite ore yielding an average of over 50 per cent. of iron, with a very small proportion of phosphorus and no arsenic, lead, titanium, or other injurious elements. It is claimed that as regards extent and purity the Wabana deposit is among the first half-dozen iron ore properties in the world. During the past ten years about 10,000,000 tons of ore have been shipped from this property, over 1,500,000 tons having been sold to Germany, about 500,000 tons to Great Britain, and over 1,000,000 tons to the United States, the remainder going to Nova Scotia.

Nickel.

More than half the world's supply of nickel is mined and shipped from the Sudbury district of Ontario. Quite recently the nickel resources of Canada, which are now controlled by an American trust, have been investigated on behalf of the British Government by Mr. Arthur Wilson, who has strongly urged the expediency of the Canadian authorities taking over their control for the benefit of the Dominion and the Empire. He said it was a matter of Imperial urgency that the Government should assume the control of the nickel deposits, thus ensuring to the Empire an enormous advantage over other countries in the supply of an ore so material in the construction of armoured ships.

Oil fuel.

Now that oil fuel is being so largely used for naval purposes, attention must be directed to the Canadian supplies of this commodity. The principal oil fields are in the province of Ontario, and the output of the wells is very large. Almost all the oil produced is sold to the Imperial Oil Company, of Sania, the largest crude oil refinery in the Dominion of Canada. There are prospects also of oil fields being discovered in the North-West Territories of Canada. About 28,000,000 gallons of crude petroleum are produced annually from the oil fields of Western Ontario, and it is claimed for this oil that it is specially adapted for use as fuel. It could easily be delivered either at Halifax or at Vancouver, and one of its great advantages is its absolute safety, while another is its cheapness.

Iron and steel.

Turning to the existing plants for the manufacture of iron and steel, these are mostly confined to Nova Scotia, Quebec and Ontario. Near Ottawa, in the last-named province, it is proposed to erect works for the production of Swedish iron made in the electric reduction

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furnace, also of iron castings, steel castings, and high grade steels, all refined in the electric furnace. Forging is carried out in both Nova Scotia and Ontario, and there are foundries for castings in all cities from Halifax to Vancouver. The Canadian Manufacturers' Association have furnished lists of a large number of companies engaged in iron smelting, steel rolling, casting and forging, and iron forging. The more important of these appear to be the Dominion Iron and Steel Company, at Sydney, and the Nova Scotia Steel and Coal Company, at New Glasgow.

Dominion Iron and Steel Company.

The Dominion Iron and Steel Company's works operate four blast furnaces, each producing about 250 tons of pig-iron daily. All this iron is converted into steel through their open-hearth plant. They also have a Bessemer converter plant, and can produce 1000 tons of steel daily. The company is now laying the foundations for an additional set of four furnaces. It is also equipped with a modern rail mill, rod mills, and a plate mill, which will produce plates of any practical length and up to 128 in. wide, while the installation of a new 28-in. mill has been decided upon which will roll other plates required in shipbuilding. The bulk of their steel has hitherto been rolled into rails, and the track of the new Transcontinental Railway is laid for many miles with rails rolled in these works. In addition, several cargoes of steel have been exported to Australia and India, and one order of several thousand tons to an English railway system. The company is greatly extending its plant, and its policy is to meet all demands made upon it by developing industries. In the event of shipbuilding being established at Sydney or Halifax requiring iron and steel in forms which they do not now make, the company is prepared to promptly instal plant to meet the new requirements.

Nova Scotia Steel and Coal Company.

The Nova Scotia Steel and Coal Company, at Sydney Mines, about three miles from their shipping piers at North Sydney, operates a modern blast furnace with a capacity of over 200 tons of pig-iron a day. The output of this furnace is transferred as liquid metal direct from the blast furnace to a gas-fired, open-hearth mixer, with a capacity of about 200 tons of molten metal, from which the fluid iron is in turn transferred to three open-hearth basic-lined furnaces, each with a capacity of over 50 tons. The furnaces produced last year about 70,000 tons of steel ingots, notwithstanding that they were closed down for two months during the early summer The standard ingot made at these works is 5500 lb. in weight, but large ingots up to about 20 tons for special forgings are also cast here. The entire product of these open-hearth furnaces is shipped by rail to the company's forging and finishing mills at New Glasgow, which are

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capable of dealing with 75,000 tons of material every year. The cogging or blooming mill has ample capacity for rolling 450 tons of ingots a day. All classes of steel sheets, bars, angles up to 6 in., and other structural shapes of approximately the same weight are also rolled. The forge, which has been in operation for upwards of 37 years, is fitted with two large forging hammers of five and three tons respectively, and there are other hammers of smaller capacity, all served by overhead, electrically operated cranes. Preparations are being made for the installation of heavy hydraulic forging plant. A large amount of marine work has been yearly turned out by this firm, forgings having been shipped to Vancouver and Victoria, and parts of the Pacific coast, as well as other places in Canada and Newfoundland. Repair work of all kinds for steamers which have come into Halifax has been carried out. The actual quantity of steel railway carriage axles made here is believed to be greater than that of any other works under the British flag, or, perhaps, than by any single company in Europe. Probably more than 60 per cent. of all the railway axles running in Canada have been supplied from these works, in addition to a very large amount of track material regularly supplied to all the leading Canadian railroads. Like the Dominion Iron and Steel Company, the Nova Scotia Steel and Coal Company is quite prepared to lay down any new plant necessary for warship building.

Machinery, armour, ordnance and ammunition.

Generally speaking, it may be said that there are ample facilities in Canada for the production of all kinds of marine engine forgings and shaftings up to 25 tons, or, say, 30 in. in diameter, and the foundries are making castings up to 8 and 10 tons. There are also several firms which make a speciality of hydraulic and electric fittings. Hitherto there has been no demand for armour-plate, and there are no works for its production. The same remark applies to ordnance and projectiles. With regard, however, to the latter, these could be manufactured with advantage near Ottawa, when the company using the electric reduction and refining gets to work. The intention of this company is to produce steel for the manufacture of armour-plate and projectiles if a demand should arise. The facilities for the production and supply of ammunition are limited in the main to such as are required for commercial purposes. There is a Dominion arsenal at Quebec which turns out small quantities of shot and shell and small arm cartridges. Rifles are also made at the small arm factory at Quebec, but the actual capacity of the establishment is uncertain. The Government ammunition factory does not manufacture its own cordite, but there appears to be no reason why military explosives should not be produced in Canada. Probably the works should be located north of the St. Lawrence and Ottawa

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rivers and further west than Quebec. The following are some of the existing plants for the manufacture of commercial explosives:—the Hamilton Powder Company, at Montreal; the Dominion Cartridge Company, with its headquarters in the same city, and factories in Quebec and British Columbia; the Standard Explosives Company, at Montreal; the Western Explosives Company, in British Columbia; the Ontario Powder Company, Kingston, Ontario; the Northern Explosives Company, Montreal; the General Explosives Company, Ottawa, with factories in Quebec and British Columbia; and the Acadia Powder Company, at Halifax. Most of these companies produce various kinds of sporting powder, explosives, and blasting compounds, and probably some of them would undertake to supply naval and military demands if encouraged to do so. A representative of the firm of Marpal, Ltd., of Cornwall, England, is reported to have been recently carrying on negotiations with a view of establishing a plant at Sydney, for the manufacture of ammunition and high explosives.

Harbours and docks. Halifax.

Next there arise the important questions of harbour and dock accommodation, and the most suitable sites for shipbuilding yards. The Dominion has recently taken over the dockyards of Halifax and Esquimalt, but it is unlikely that at any early stage the latter place would be regarded as affording the necessary advantages suitable for making a beginning with warship construction. On the other hand, Halifax and Sydney, in the province of Nova Scotia, are two of the world's greatest harbours. The former has been our principal naval station on the American side of the North Atlantic for a very long period, and there is a considerable water front and other available property under Government ownership. In Halifax harbour the largest ships can use the docks, and at the northern end of the harbour the Narrows, a sheet of water about six miles long by four wide, has a depth of water and area sufficient for the accommodation of any modern fleet. The city and harbour are also protected by modern fortifications. There is a dry dock at Halifax 571 ft. long at the bottom and 592 ft. at the top, with a width varying from 70 ft. up to 102 ft., while the depth over the sill at high-water spring tides is 30 ft. Halifax is looked upon by many people as the most likely place for beginning operations for the construction of a navy.

Sydney.

Sydney, the eastern terminus of the Intercolonial or Government Railway, is 276 miles north-east of Halifax. The harbour has an area of about 25 square miles, with safe anchorage and good holding ground, and a depth of water at the docks of from 30 to 40 ft. The entrance is well lighted and easy of approach. The southern and north-west arms are usually closed by ice from the latter part of

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January to the first of April. The lower part of the harbour, from the entrance up to five or six miles from the centre of the town of North Sydney, including the docks of the Nova Scotia Steel and Coal Company and the Intercolonial Railway, is rarely closed during the winter months, but the whole of the harbour mouth is liable to be blocked by drift ice during February and March, while Halifax is an absolutely ice-free port at all seasons of the year.

Louisbourg is another ice-free port, and Pictou, on the north or St. Lawrence coast of Nova Scotia, is a good and safe harbour, easy of access. There are slips at Pictou capable of dealing with vessels of 1200 tons register, and the coal companies have large docks here.

Proposals for naval construction.

There are several other places which have been indicated as suitable for shipbuilding, and it is understood that a number of dry dock plans have been discussed by the Canadian Government. One of these takes the shape of an alliance between Messrs. Harland and Wolff, the well-known shipbuilding firm, and several of the Canadian shipping companies. It is announced that dry docks, 900 ft. long, 100 ft. wide, and 35 ft. deep on the sill, with repairing plant, will be constructed at Point Levis, opposite Quebec, and St. John, New Brunswick. This project is primarily commercial, though the dock at Levis will be under the guns of the forts. The site has advantages from the point of view of navigation, as the place will be free from ice longer than is the case higher up the river. It has also cheap water communication, and is connected with the steel works at Sydney by the railway. The necessity for having two dockyards arises from the summer and winter conditions of navigation. Another plan connects the firm of Messrs. Swan Hunter and Wigham Richardson with the municipalities of Halifax and Dartmouth, while a third speaks of the establishment at New Glasgow, on the north shore of Nova Scotia, of a branch of the Vickers, Sons & Maxim firm in connection with an existing yard there. None of these projects appears to be very far advanced, but generous assistance would probably be asked from the Government and be afforded.

Steel shipbuilding.

Few steel vessels appear to have been built in Canada, although wooden shipbuilding was a flourishing industry until not many years ago. In 1893, Messrs. I. Matheson and Company built for the Canadian Government the steel screw steamer Mulgrave, and in 1908 the same firm built the three-masted steel schooner James William, of 500 tons, for the firm of Messrs. J. W. Carmichael and Company, of New Glasgow. These vessels were constructed by native labour, the hull, machinery, and boilers being supplied complete by the builders from their Glasgow works. The steel used came from the Nova Scotia Steel and Coal Company, while Dartmouth and Yarmouth, in Nova

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Scotia, also shared in the provision of materials for the ship's equipment.

Ship-yards on the lakes.

Although the chances are that for the larger ships, the ports of Nova Scotia are more likely to be favoured with the advantages they possess naturally, and those given them by existing docks and plant and vicinity of the two steel companies, which would certainly produce higher grades of the material when required, yet there are also yards on the lakes which would make a bid for the construction of destroyers. One of these is at Toronto, another at Collingwood, on Georgian Bay, and a third at Bridgeburg, on the Niagara river. That at Collingwood is one of the best-equipped of the smaller yards on the lakes, and some Government work has already been given to the Ontario shipyards. The main objection to building destroyers on the lakes arises from the convention of 1818 with the United States, which forbids the construction or maintenance of warships on those waters. The objection, however, would not arise in the case of auxiliaries, such as are now needed in connection with every fleet. Similarly, we need not consider possible construction at Esquimalt, Victoria, and Vancouver, where, however, there are, in addition to the Government dockyards, some small private establishments.

Labour.

Finally, there is the question of labour, and in this respect, owing to the large increase and development in manufacturing throughout the maritime provinces, there is a plentiful supply of skilled workmen in the iron and steel industries. The bulk of the people in Nova Scotia are of Scotch extraction, and owing to the free schools which have been established throughout the length and breadth of the province for more than fifty years, a very intelligent class of workman, with a great range of adaptability, is available. But while there are numbers of skilled machinists and fitters, and mechanics skilful with almost any tools, labour of a technical kind for the designing and drafting rooms, and men expert in warship building, would either have to be imported, or young Canadians could be sent home to qualify themselves for the particular work required. British firms establishing themselves in Canada would probably find their labour problems in organisation, and in the settlement of those questions connected with making the imported foremen and specialists satisfied and contented amongst their new surroundings.

Difficulties to be surmounted.

From the above particulars it is obvious that in connection with the project of building a navy for Canada, while there is a sound foundation upon which to make a beginning, nearly everything has yet to be accomplished. There is no shipbuilding yard adequately equipped with men and plant for the purpose. The special grades of steel are not yet manufactured, the tools are not yet installed, and

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the machinery used in war vessels is not made. The many problems concerned with the production of armour, ordnance, projectiles, and explosives, all remain to be solved. Native-built vessels will cost 22 per cent. more than if they were built in England, apart from the expenditure on plant, etc. They will also take at least twice as long to build, an important matter, since this means in the case of warships a shorter effective life. Nevertheless, the Dominion is favourably situated and fortunate in that it is rich in natural facilities and raw materials, while in the patriotism and enterprise of its people it possesses a factor which by the development of existing industries must make for eventual success.

AUSTRALIA.

Australia's aspirations.

It has been shown in the earlier portion of this article how gradually there has grown up in Australia the wish to have a navy of her own. Complex as have been the causes which aroused and fed this aspiration, two are particularly manifest. There has been a quickened sense of responsibility, accompanied by a development of the maritime spirit, which is every Briton's birthright here and overseas. Also has come a wider knowledge of naval needs under changed conditions, such as Mr. F. W. Ward referred to at the Imperial Press Conference when he said :—

> For a hundred years and more Australians had lived in absolute security. The geographical situation of Australia had had something to do with that in the past, but with the advance of science, which had annihilated distance, they had of recent years come within the zone of danger. Australians realised that if there was any doubt about Great Britain's supremacy on the seas, they were right in the thick of it. Therefore, the question of naval defence was one of life and death to them.

Nor have the Australians been without encouragement from others to build a fleet. Mr. Amery, at the same conference, said that in considering the best means by which the Empire could combine to defend itself, two broad principles stood out :—

> One was that our organisation for defence must correspond with the constitutional position, and from the broader point of view of strategy it was essential that our sea-power should not be merely concentrated in one part of the Empire. In the future, the great struggle of the world might be as much in the Pacific as near our own country. We wanted our naval power to be based not only on Portsmouth, but on Vancouver, Sydney, Durban, and Simonstown, so that we could be fighting in Home waters even if we fought in the Pacific.

And Mr. McKenna also, in his address at the Imperial Press Conference, said :—

> It is only by your working out your problems for yourselves that you can ever gain the experience which we have had to gain, and lessons, if they were told to you of the experience of others, would never come home to you with the same force as lessons you have learnt for yourselves, even though you have learnt them through your own mistakes.

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First steps towards naval construction.

The Commonwealth, however, with the experience of several of its States in naval matters to guide it, does not intend to launch out directly into warship construction. As a beginning, three torpedo-boat destroyers have been ordered and built in this country, and one of them will be taken out in parts and put together at the Government yard at Cockatoo Island. Thus practical knowledge of the utmost value will be obtained, and the little band of workmen who have been trained in the establishments on the Clyde will provide the nucleus of skilled labour. It is not intended here to deal with this phase of the subject, but to give the result of the investigation which has been made as to the resources of the Commonwealth if it is to make its own steel and armour, manufacture its own machinery and ordnance, and establish and develop its own shipyards.

Coal.

In regard to the coal production, this, which less than thirty years ago was under 2,000,000 tons a year, has now reached considerably over 10,000,000 tons, while it is increasing steadily, and fresh mines are from time to time being discovered. The immense coal fields of New South Wales point to an advantage which Sydney will possess as a centre of the shipbuilding industry. Coal is also found in considerable quantities in Victoria and in Queensland, although the output is not increasing rapidly.

Iron, nickel and timber.

There are large deposits of iron ore in Australia, but these have been little utilised until quite recently. It has been estimated that the quantity of ore available for exploitation in New South Wales exceeds 50,000,000 tons, and that about half as much again is in sight in South Australia. In the other States, also, there are rich and extensive deposits. Most of these deposits of iron ore are to be found in close proximity to extensive coal fields and supplies of limestone. A difficulty, however, is met with in working the mines cheaply, since labour is paid more highly than in European countries. Manganiferous ores are found in considerable quantities in New South Wales, South Australia, Queensland, and Western Australia. Nickel also has been discovered and worked, but hitherto there has been no great production of any of these ores. It could, however, be obtained from New Caledonia, 1100 miles from Sydney. Of timber for commercial uses there is practically an unlimited supply. The forest area of Australia has been calculated to cover 150,000 square miles. There is a large and increasing export of undressed timber, the great bulk of which consists of hardwoods. Legislation has been enacted to prevent the useless waste of forests, and there is in the Commonwealth a growing recognition of sylviculture, while in each State nurseries and forest plantations have been established.

Oil Fuel.

Should liquid fuel come into general use for naval purposes, it

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will be unnecessary to go outside the Empire for a supply. The oil shale industry in New South Wales is said to be among the richest in the world. At Walgon, the quantity of shale in the property is estimated at 20,000,000 tons, and the yield is as much as 100 gallons of oil to the tone of shale. It is very rich in material for fuel purposes. In addition to the Walgon River shale workings, there are other shale mines in the State, and the output continues to increase in value every year.

Lithgow Steel and Iron Works.

The only plant for the production of iron and steel from the native ores is established at Lithgow, under the management of Messrs. C. and C. Hoskins, Ltd., which may become the centre of the Commonwealth's steel manufacturing industry, and possibly the Government arsenal and manufactory of warlike material. It consists of a blast furnace 80 ft. high, 29 ft. outside diameter, with three stoves, and is capable of producing about 1000 tons of pig-iron a week. There is also a Siemens-Martin open-hearth basic-steel furnace, and a series of rolling mills for the conversion of iron and steel into finished bars and plates. The owners of the ironworks also control a large pipe-making establishment near Sydney, and a large proportion of the pig-iron made is used in their foundry for cast-iron pipes. Lithgow is in direct railway communication with the coast, and about 94 miles from Sydney. The iron ores, the bulk being hematite, carrying over 50 per cent. of metallic iron, are brought to the furnace from the deposits of Carcoar and Cadia, situated about 90 miles west of Lithgow. The smelting operations, therefore, are carried on at a site about midway between the ore and the coast. There are abundant supplies of coal and coke in the district, limestone is brought from Portland, about 16 miles distant, and there is an unlimited supply of water. The management at Lithgow have not up to the present undertaken the manufacture of steel forgings; the total output from the steel furnaces being absorbed in supplying merchant bars and sections. Steel castings up to 12 tons have been made at the works, but these were special productions in connection with the steel and blast furnace plants. No large plates have been made. Apart from the Lithgow works, no cast iron is made in New South Wales, but Melbourne engineering firms can produce castings up to 12 tons, and forge up to 30-in. diameter shafts, and about 16 tons weight.

Melbourne Engineering Works.

One of the oldest of such firms is the Victoria Iron Rolling Company Proprietary, Limited, founded in 1858. The company's works are situated at West Melbourne, where forgings are made of iron or steel, and much work is done for the Victorian Railway Department. With a demand for steel from Australian ores, the capacity of this company may become considerably developed. At or near the port

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of Melbourne, Victoria, the following firms were engaged in marine engineering and shipbuilding work:—Messrs. Robinson Bros., Yarra Bank, Melbourne, general engineers, making castings up to 10 tons, and forgings up to 18-in. diameter shafting, they are also makers of centrifugal pumps; Messrs. Johnson and Sons, Yarra Bank, boiler makers; the Austral Engineering Co., South Melbourne, general mining engineers, who cast up to 12 tons; Messrs. Methan and Fergusson, Footscray, steel hydraulic pipe makers and general engineers; the Melbourne Shipping and Engineering Co., Williamstown, who maintain and repair their own fleet of steamers; Messrs. O'Grady and Co., South Melbourne, general engineers, undertaking the repair of marine engines; Messrs. Forman and Co., Yarra Bank, marine engines; and Messrs. Gray Bros., and Co., Williamstown, shipbuilding, marine, and general engineers, with special facilities for effecting heavy forging work. There are several engineering plants in Perth and Fremantle, Western Australia, capable of turning out good work, but only castings of moderate dimensions can be dealt with by them. An official report of the engineering and shipbuilding establishments and workshops in Australia in 1907 showed that there were 679 engineering iron foundries and metal factories, employing 17,388 men; 74 smelting works, employing 8631 men; 128 electric light and power works, employing 1569 men; and 70 ship and boat building and repairing establishments, employing 2049 men.

Electrical fittings.

As regards plant for electrical fittings, it is believed that the only firm which is thoroughly equipped for the manufacture of all kinds of electrical machinery such as is used in warship construction and equipment is the Weymouth Proprietary Ltd., of Neptune Street, Richmond, Victoria.

Ammunition and explosives.

The facilities for the production and supply of ammunition, arms, and explosives are in course of provision. There are factories for making sporting guns, powder, and blasting compositions, three in New South Wales and five in Victoria, but none in the other States. No naval ammunition is made locally. The site for a cordite factory has been secured in the neighbourhood of Melbourne; the buildings are estimated to cost £30,000, and the machinery £36,000. The contracts are to be placed this year, and a superintendent has already been appointed. It is expected that the output of the factory will be about 50 tons a year. Contracts for plant and machinery for a small arms factory to be delivered in September of this year have been placed in the United States. The site is to be at Lithgow, and the capacity of the new factory will be 15,000 rifles per annum, besides other arms. The Australian woods are to be tested as to their suitability for stocks of rifles.

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Labour.

So far as labour is concerned, industries are well organised, trades taught, and there are many technical schools and schools of mines, etc. It can hardly be said of Australia that there is no skilled labour for warship construction, since the New South Wales Government are quite prepared to build destroyers, and the Victorian Government has also engaged to undertake similar work. Doubtless some reliance is placed upon the artisans who have been sent to Messrs. Denny and Bros. and the Fairfield Company for experience in this particular class of work to supply foremen. From many parts of Australia, too, it is understood that applications have been received from men who have had experience of warship building in Great Britain. The rates paid in the Government establishments are also calculated to attract a class of experienced workmen from shipbuilding establishments at home, if it becomes known that suitable situations are open to them. The present rates of wages are as follows:—Shipwrights, 12*s.* a day; fitters, turners, blacksmiths, pattern-makers, moulders, and coppersmiths, 10*s.* 8*d.* a day; shipbuilders, boiler-makers, carpenters, 10*s.* a day; machinists, 8*s.* a day; and labourers, 7*s.* a day. In each case the day is one of eight hours.

Harbours and docks.

It will be unnecessary to describe the many land-locked harbours and magnificent anchorages with which Australia abounds. All the chief ports are supplied with wharfage and repairing yards, and there is adequate docking accommodation for present needs. The harbours are controlled by harbour trusts, with considerable powers. Land and water carriage is well developed, and good railway systems connect the interior with the coastal towns.

Cockatoo Island Dockyard.

The Government Dockyard is on Cockatoo Island in Sydney Harbour, at the entrance of the Parramatta River. This island has a total area of 31 acres and a water frontage of 6245 ft. It is of sandstone formation, the centre rising some 45 ft. above the water level. Two graving docks, called the Fitzroy Dock and the Sutherland Dock, are on this island. The Fitzroy Dock, the smaller of the two, was built about fifty years ago, and is of the following dimensions:—Width at entrance, 59 ft.; depth over sill, 19 ft. 6 in. to 21 ft. 6 in. at high water, neap and spring tides respectively. It is capable of taking a vessel of 450 ft. in length. The Sutherland Dock, constructed some twenty years ago, is of the following dimensions:—Entrance, 84 ft.; depth of water over sill, 29 ft. 6 in. to 32 ft., at high water, neap and spring tides respectively. It is capable of taking a vessel up to 600 ft. in length. There are good sites on the island for building slips, and vessels up to a length of 450 ft. could at present be constructed thereon. There are now in course of construction two all-round cantilever cranes of a capacity of 5 tons, with a radius of

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75 ft. These two cranes will command when completed two slips of 350 ft. in length by 50 ft. in breadth. The workshops cover an area of eight acres, and are capable of carrying out the construction of a modern vessel fitted with machinery of the reciprocating class, boilers, either water tube or Scotch, and the other equipment necessary for the completion of such a ship. The whole of the plant, including cranes, etc., is electrically run, the power being generated on the island. The construction of turbine machinery would require additions to the present plant estimated to cost £10,000, and it is probable that before long an expenditure will be made in this direction. The workshops include, besides the ordinary machine and erecting shops, an iron and brass foundry, steel foundry, and heavy forge. The dockyard is electrically lighted. Owing to the deep-water frontage ocean-going vessels can discharge direct at the island, and material obtained locally can be taken in lighters to the island at an average cost of 2*s.* 6*d.* per ton.

Mort's Dock.

Mort's Dock, a private establishment, embraces three important sites on the frontages to Sydney Harbour. The headquarters at Mort's Bay cover 20 acres, with water frontages of 2000 ft. to about 20 ft. of water. The premises are equipped with a graving dock 640 ft. long, with 69 ft. entrance at top, 54 ft. at bottom, controlled by two steel caissons capable of shutting off the top end of the dock while using the entrance end for docking and undocking. There are also three patent slips of 58 ft., 200 ft. and 270 ft. length of cradle, for vessels of 40 tons, 800 tons, and 1800 tons respectively. The workshops are equipped for the shipbuilding, engineering, boiler-making, blacksmiths', coppersmiths', and allied trades, and every requisite for the building, docking, and repairing of vessels of all kinds. The saw-mill and joinery buildings are fitted with a drawing-room board floor of large dimensions. The machine shops are ranged beside the dock and slips, and the equipment includes steam, hydraulic, electric, and pneumatic plant for all sorts of appliances. There are about 50 lathes, the largest being capable of taking in work up to 27 ft. diameter and 36 ft. in length. Of the planing machines, one has a table 18 ft. long, and can work over a breadth of 9 ft. and a height of 8 ft. There are also steam hammers and fully-equipped foundries in iron, brass, and steel. The wharves, yards, and appliances, docks and shops, are connected up by tram lines.

Woolwich.

The Woolwich branch of the establishment is at the entrance to the Parramatta, and occupies 23 acres of land, with about 2500 ft. of frontage to water about 26 ft. deep. Here there are admirable building sites suitable for the largest vessels. The Woolwich Dock

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is excavated in stone, and is now 675 ft. long, with an entrance 83 ft. wide and 28 ft. 9 in. depth of water on the sills at high tide. It is intended to lengthen it to 765 ft. There is also an iron pontoon dock capable of lifting 1500 tons. The shops and yards are well equipped with cranes and other appliances, and all the conveniences of a first-class establishment. It is about 15 minutes by water from headquarters. The Jubilee premises of the same establishment are on Johnstone's Bay, and have an admirable water frontage, opposite which is moored the floating dock, a wooden structure 317 ft. long, 55 ft. in breadth, with a draught of 15 ft. It is capable of lifting vessels up to 1500 tons. Associated with this is a similar dock for vessels up to 120 tons. There are also the usual workshops and appliances.

Other Australian docks.

Other docks in Australia are the Alfred Graving Dock and patent slip in Victoria, and three smaller docks in Victoria. The dimensions of the largest are 470 ft. by 80 ft., with 27 ft. over the sill. At Adelaide, in South Australia, there is a dock 500 ft. by 60 ft., with a depth over sill of 26 ft. The Government graving dock at Brisbane is 430 ft. by 44 ft., and has a depth over sill of 19 ft. at high-water spring tides. A graving dock is under construction at Fremantle, Western Australia, having a length of 850 ft., a breadth of 100 ft., and a depth of water over sill of 33 ft. When completed, this dock will be capable of accommodating the largest and heaviest classes of vessel.

The following summary of the position as regards the shipyards in Australia and the prospects of shipbuilding has been kindly sent to me by a technical correspondent of large experience who has recently visited the Commonwealth.

A naval architect on Australian shipbuilding.

It has been estimated that there are nearly 2000 shipyard and engine workers in Australia. About 1500 of these are employed in Cockatoo Island, in the State of New South Wales, and in the Mort's Dock, both at Sydney. The largest vessels built there are ferry steamers 280 ft. long. The shipyard tools are mostly arranged and devoted to repair work, upon which nearly all the workmen are employed. Probably about four-fifths of them on an average are doing repair work. The tools in consequence are of a heavier nature than is represented by the output of new work, especially for plates. The frame setting is therefore not of an order suited to the largest class of work they do, which is already indicated. It would not, however, be very difficult to increase frame-setting facilities, so that with the proper material supplied they could probably build about a 3000-ton steamer. The boiler plates cannot be made in the country. About three-eighths of an inch plates are the maximum thickness supplied.

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Angle bars of any size suitable for a 3000-ton ship can be rolled at the steel works, where the plates also are made. These are the only steel works in Australia. They turn out steel at about £10 a ton, and pig-iron at £4 a ton. Shafting and forgings can be made in the shipyard up to about 7 in. diameter. It has to be made from ingots sent from this country. Their plant for doing this work consists only of steam hammers. There are men in the country who have been shipyard workers, and who frequently work at other things, but who, when there is sufficient work, return to shipyards. The fluctuating amount of the work makes the employment for skilled hands uncertain, so that on the whole they are not so well off as in this country. On the other hand, unskilled labour is more regularly employed, and the men are better off here.

There are two shipyards, as already stated, in Sydney Harbour, but they do a very small amount of new work. A ship a year is about their maximum output. The shipyard on Cockatoo Island belongs to the State of New South Wales, and was formerly a convict settlement. While the convicts were lodged there they made a big dock. It is large enough to take in the Indomitable. When Cockatoo Island ceased to be a convict settlement the Imperial Government handed it over to the State of New South Wales, and it was taken charge of by the Public Works Department of the State. The convict prison is used as a common gaol, and shipyard and engineering work done there was small craft, dredgers and any casual repairs which the Imperial Fleet required. Later the State exchanged Garden Island for some land on the mainland, and fitted up Garden Island with some shipyard tools. This is now the storehouse of the Imperial Fleet, and they have a few tools capable of doing ordinary running repairs for the Fleet. There is no dry dock at Garden Island, all that sort of work being done at Cockatoo Island.

Melbourne docks.

There are some dry docks at Melbourne, but very little shipbuilding. Anything that is done is of a very small character. The steamship companies usually have their repair staffs both at Sydney and Melbourne, and do as much of their own repairs as they can. When they have more than they can do they draw on the resources of the Mort's Dock or Cockatoo Island. Australia has no shipbuilding facilities, but has sufficient plant for ordinary repairs of ships built elsewhere. Ships are imported free, while all materials connected with the building of ships are subject to a high tariff. There is some rebate given to steel makers for steel manufactured in their own country. The steel works struggled through to the point of having the technical ability to do work, but they failed commercially. They have been taken up by new people with new capital, and it has

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been proposed to put in heavier plant. It is difficult to see how without considerable development and assistance from this country Australia can be trusted to build ships.

SOUTH AFRICA.

Cape Colony.

In dealing with the resources of South Africa for warship building, it has been deemed better to treat the colonies severally. The subject has not yet assumed definite shape, although it has been discussed officially. When the Union becomes an accomplished fact, the question is sure to arise, and the information here brought together may then be useful.

Raw materials, coal, iron, etc.

In the Cape Colony, the total coal output during 1908 was 122,865 tons. Compared with Welsh coal, it is of inferior quality. New coalfields have recently been discovered in the western province. No iron ore is worked in the colony, although a discovery of hematite has been reported from the Kuruman district. Copper nickel ore has been found in the district of Mount Ayliff, but the mine is as yet only in a development stage, and no information in regard to quantity is available. Manganese is found in many localities in the western province, and some quantity has been shipped to Europe for testing purposes, but no actual mining work is in progress.

Timber.

The Crown forests, the most important of which is the Knysna, of the Cape Colony cover an area of about a million acres, and of this area about 750,000 acres is clothed with high timber. A full description, with illustrations of the trees, may be found in a work, entitled, "The Forests and Forest Flora of Cape Colony," by T. R. Sim, and the annual Government Reports. The timber is principally used for railway sleepers, for waggon making, and in architecture. A scheme of afforestation is being carried out by the Forest Department on a considerable scale.*

Harbours and docks.

Plant for ship construction at present is practically non-existent. There are docks at Simon's Bay and Cape Town, and a slipway at Port Elizabeth Harbour, and in addition to the facilities at these places, it is probable that the mechanics employed in the locomotive branch of the Cape Government Railways would under suitable supervision be quite capable of effecting ordinary repairs to the hulls, machinery, and fittings of warships. The railway machine shops are adequately equipped with all the usual tools required for their purpose.

Simon's Bay.

The Government naval docks at Simon's Bay are now approaching completion. They consist of a breakwater and a pier, enclosing an

* Great attention is being paid to planting in all the South African colonies.—Ed.

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area of 28 acres, the depth of water being from 30 ft. to 37 ft. There is also a graving dock 771 ft. in length, which can, however, by an alteration in the caisson, be given an additional length of 21 ft. The width of the dock at coping is 120 ft., while on the floor level it is 80 ft. The depth at the outer entrance from coping level to sill is 42 ft. 6 in., and at low water the depth at this point is 30 ft. The dock, as above indicated, can be divided into compartments in order to take in vessels of different measurements. It is of sufficient size to accommodate any warship now existing or at present contemplated. Provision is made for carrying out repairs of all kinds, but nothing has yet been arranged with a view to construction.

Table Bay.

There are no shipyards at present at Table Bay, but suitable sites are available with railway communication. There is a graving dock 500 ft. long on the floor, with 50 ft. width of entrance, and 21 ft. over sill at low-water spring tide. This dock has recently been equipped with pumping machinery of the most modern type, capable of emptying the dock in three hours. There is also a slipway which takes craft up to 500 tons. The machine shops are spacious and up to date, and are placed alongside the dock, with railway communication. They comprise machine and fitting shop, boiler shop, smithy, foundry, joiners' and pattern shop and saw-mill. There are extensive drawing offices, suitably arranged for the handling of naval work. Electric power is provided, there is an abundant supply of fresh water, and the supply of skilled labour is variable, being dependent on the state of trade. The workshops, wharves, and docks are all within the protection of the surrounding forts. There does not exist in the Cape Colony any plant suitable for the production of steel or armour plates, but forgings and castings of moderate size are made, and also machinery and hydraulic and electrical fittings as required.

Port Elizabeth.

At Port Elizabeth Harbour, Algoa Bay, the patent slipway is capable of carrying a vessel of 400 tons, drawing up to 14 ft. 7 in. at high-water springs. There is also adequate equipment for dealing with the ordinary shipping interests of the port. Schemes have been proposed for enlarging the jetties and wharves, and improving the protection to shipping by enclosing the harbour. Castings of iron up to 2 tons weight can be managed by the engineering firms in the town, and some repair work could be carried out by the Government shops at the harbour works or at the railway workshops at the north end of the town.

Ammunition and explosives.

At present there are no local supplies of cordite or of other explosives except for commercial purposes, and none of the raw materials required for their manufacture can at present be obtained in South Africa. The Cape Explosives Works have the largest foundry in the peninsula, and experience no difficulty in producing at

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reasonable cost the castings required in connection with their business. There seems to be no reason, therefore, why a Government factory should not be able to manufacture steel shells. If it should be found expedient also to establish a cordite factory, or to manufacture high explosives under Government supervision, there are several reasons why it would be advisable to choose a site for the factory at no great distance from the naval base and dockyard. There are no facilities at present for the manufacture of torpedoes; the work is of a special character, and requires highly skilled labour.

Natal.

Just as Cape Town and Simon's Town naturally suggest themselves as the ports in the Cape Colony where, if it was decided to undertake the construction of small cruisers or torpedo craft, it would be advisable to make a start, so Durban, in Natal, has many natural and other advantages for the same purpose. The harbour is not difficult of protection. It may be entered at any time by ships drawing up to 33 ft. of water, and although there are no shipyards at present, suitable sites can be made available.

In the port is a floating dock to take 8500 tons dead-weight and a floating workshop equipped with 15-ton steam cranes, steam hammer, drilling machines, lathes, etc. There are four large private engineering works at the port, well equipped, and able to undertake large repairs to boilers, machinery, etc. Kynoch's, Ltd., have a large factory for manufacturing explosives about 12 miles from Durban. It has been estimated that there are about 2000 skilled workmen employed at Durban in engineering and similar works.

Coal.

There are abundant supplies of coal in Natal of all classes, from bituminous to anthracite. Most of the collieries are situated in the Klip River coalfield, 218 to 268 miles from the port of Durban. The coal output of the Natal collieries in 1908 was 1,669,774 tons; of this amount 446,915 tons were exported, and 710,777 tons were taken for bunker use by vessels calling at Durban. Coke is produced by the Natal Navigation Colliery Co., which made 892 tons in 1908. Some of the coal is of better quality than Cape coal. It is used by the Union-Castle Line for the homeward voyage.

Iron and nickel.

Iron ores are widely distributed in Natal, but are not being worked at present. Hydrated ores in extensive surface deposits are receiving attention at Alverstone and Pietermaritzburg, while beds of high grade magnetic iron ore occur near De Jager's Drift and Greytown. These places are distant by rail from Durban, De Jager's Drift, 257 miles; Greytown, 136 miles; Pietermaritzburg, 71 miles; and Alverstone, 33 miles. Nickel ores are not known to occur in important quantities in Natal. Manganese ores are widely distributed, but are not worked. All iron, steel, etc., is imported. Forgings and

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castings can be undertaken up to 5 tons in the establishments at Durban, cylinders are made up to 84 in. in diameter, and shafts up to 9 in. in diameter and 12 ft. long. Repairs are effected to hydraulic and all electrical work. An official report on the Natal forests, their conservation, improvement, and extension, indicates that when further attention has been paid to this matter, "the greater part of some £180,000 now being paid out of Natal every year for timber and wooden ware of all kinds would be retained in the country; and this without detriment to any branch of productive activity."

The Transvaal.

The Transvaal possesses immense deposits of coal and iron, though up to the present the first-mentioned mineral only has been developed and brought to the producing stage. There is no existing plant for the production of steel, etc., and the only machine shops of importance are those at Pretoria used by the Central South African Railways. All ammunition is imported into the Transvaal. Such skilled labour as exists consists of men chiefly employed on the mines, Government railways, and the public works of the Government and municipalities.

Orange River Colony.

Similarly the resources of the Orange River Colony in respect to this subject are very limited. There are extensive beds of coal, and something over 500,000 tons are mined annually on the Vaal. It does not appear, however, to be suitable for ordinary naval requirements. There are also undeveloped beds of iron ore in the colony. There is no plant for the production and manufacture of steel. In the railway workshops, forgings up to about 1 ton in weight could be dealt with, and castings up to about 2 tons weight. The machine shops could probably be utilised for the manufacture of light gun-mountings or auxiliary machinery, but not for very heavy work. There are no facilities at present for the production and supply of cordite ammunition. The workshops at the mines have plant which is suitable only for the production and manufacture of forgings and castings required in mining operations; and in the same way their skilled workmen are fitters, carpenters, boiler-makers, and blacksmiths, but not the skilled labour necessary for the purposes under consideration.

NEW ZEALAND.

The position with regard to New Zealand was put very clearly by Sir Joseph Ward at the Colonial Conference of 1907, when he pointed out its difference from the Commonwealth of Australia and the Dominion of Canada in respect to this subject. He said:—

> We have before the people in New Zealand still the work of the interior development of a country which, in the years to come, will be capable of carrying

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20,000,000 people without any difficulty. We have under 1,000,000 of population at the moment. We have all the ramifications of the development of great public works, so essential as a provision for the future to enable people to settle in the interior of our country. We have still before us the making of the railways throughout our country. Though we have between 2000 and 3000 miles of railways open to-day, it is comparatively speaking but the fringe of what the future years will require to have established in the country in order to meet the requirements of its people. That is one aspect of the matter which any young country, such as the one I represent, with its future all before it, has to very seriously consider. It is because of the fact that we have these great undertakings that may take years to fulfil in the future before us, that we should hesitate to impose upon ourselves the burden of the construction of ships of war, or of any great liabilities connected with the maintenance of ships of war, or any great financial responsibilities other than we actually commit ourselves to in a defined agreement.

In New Zealand there is docking accommodation for a Dreadnought, and all the facilities for the repair and maintenance of smaller vessels; but in view of the attitude of the New Zealanders towards the question of warship construction, it is unnecessary to investigate the resources of the islands.

Colonial naval construction a dream at present.

It will now be well to attempt to draw some large conclusion from this review of the resources which each of the Dominions possess for entering into world competition as navy builders. Clearly, whatever policy is adopted for the purpose—that of developing local effort and industry, or that of encouraging some old established company at home to start work in the colony, or that of a combination of these two alternatives—a beginning has yet to be made. Raw material there may be in abundance, but of the tools for turning that material into effective and fully equipped ships very few. Steel works, engine works, ordnance works, and shipyards have all yet to be established. Moreover, naval arsenals and dockyards must be given some amount of protection or they invite attack.

Methods of starting the work.

Two important factors in the problem are capital and continuity of employment, and with these may be bracketed skilled labour. If the practice which has commended itself to some foreign countries be followed, then those Dominions which intend to provide their own fleets will enter into negotiation with some one or more Scotch or English firms of well-established reputation, and employ them either to start branch works in the colony or to assist in the development of local enterprise. It would seem that only in this way can the highest standard of work be attained. To attract such assistance, however, something more than a promise of financial provision for a year or two will be needed. Probably, a guaranteed programme, involving a definitely large expenditure spread over a stated period, accompanied with some arrangement for eventually buying out the interest of the home firm, would be the wisest and cheapest method of obtaining the necessary assistance.

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The obligation to continue.

There is no company which, by its own unaided efforts, undertakes the provision of the complete outfit of a first-class battleship from framework to finished article. Even when the firm is shipbuilder, engine-maker, and gun manufacturer, there is still much it must obtain, in order to suit Admiralty requirements, from sub-contractors. Obviously, then, even if an outside firm is employed to give the benefit of its invaluable experience and knowledge, there should be ample opportunity for local establishments to assist in the undertaking, and for the development of local effort. As it is with a battleship so in a lesser degree with the smaller vessels, and with regard to the continuity of work it may be said that once a start is made it will be almost impossible to stop. Plant and labour must be given employment, whether in a public or private establishment, if there are to be satisfactory results. As the Fleet grows, the work grows, too. The smaller the ship, the shorter her effective life. No sooner is a vessel launched than later improvements and newer inventions produce in her the first stages of obsolescence. What Lord Rosebery said of the Imperial Fleet will apply also to the fleets of the Dominions. They may even become prodigious, but they will always be inadequate.

The ideal aim.

An attempt has been made to show how the slow but continuous growth of a feeling of responsibility in the Oversea Dominions has developed towards co-operation for naval defence; how also this feeling has aroused in Canada and Australia a desire to provide their own contributions to such defence locally, and how a section of the people in these Dominions has conceived it to be their duty to the Empire and themselves to undertake the work of navy builders in spite of the obvious and manifest difficulties presented by such a task. Furthermore it has been necessary to point out that from an economic, strategical, and statesmanlike point of view many advantages must be sacrificed in the attempt to find a solution of the problem in this way. Hope for the future lies in the better appreciation throughout the Empire of the common danger and how it must be met. Safety lies in making the Navy so strong as to ensure peace. Meantime, it may be felt that the maritime spirit will be fostered, the pride of nationhood intensified, and that as with every year the Dominions increase in trade and wealth, so they will aspire to take a really substantial and not inadequate share in the mutual protection of Imperial interests. With a wider knowledge of the higher policy of defence, there will be less attraction towards the pernicious doctrine of local and sedentary methods of protection. It will be better realised that, as the only real defence is to beat your enemy, so the only way by which the enemy can be beaten is to

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resist him at sea. Only a fleet or fleets with a wide range of action can protect the sea-borne commerce of the Empire and secure from molestation the territories of the Dominions. Moreover, it is as true now as it was a hundred years ago, that, as Sir Thomas Pasley then wrote:—

> The strength of an Empire of any kind, whether insular or continental, will be greater or less, with equal resources, in proportion to the facility with which its separate parts can afford each other mutual assistance when attacked.

CHAS. N. ROBINSON.

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CHAPTER X.

SEA-TRAINING.

PROBABLY the subject of Sea-training is, in the minds of the majority of the public, confined to what is done on reformatory ships. This is not only to be regretted from the point of view of those who have at heart this vitally important question, but also from the point of view of the public, who, by thus dismissing the matter in a phrase, omit from their sympathies a most interesting and progressive cause. Sea-training, as it is now being developed, affects every member of the community, from the least burdened ratepayer to the imperially-minded statesman, and affects each individual in his three most susceptible points: his pocket, his heart, and his head. It presents alike a problem, a national cause, a parochial relief, and a charitable endeavour.

To many interested in the subject, the proceedings and report of the Departmental Committee of the Board of Trade on Sea-training in 1907 came as a surprise. The evidence given by those who have, through many years of experience, been working in this field, and have thus qualified as experts, no less than that of shipowners, sea captains, educational authorities, poor law guardians, and social reformers, all tending to one common end, was a revelation to those who followed either the Press reports of the sittings of the Commission or subsequently read the Report. The Report showed definitely what some of us had had brought home to us before, that sea-training, properly organised, is at once a social remedy and a patriotic necessity, and for these reasons: In the first place, it is obvious that two great evils exist and tend to increase, viz., first, the over-crowding of our cities and towns by an enormous surplusage of male youth, at present without a future, who might form the supply for training for the Mercantile Marine (which is axiomatically the foundation of Empire); and, secondly, that there is employed under our flag a body of aliens forming in large proportion the crews of British vessels. How to provide an honest and manly career for the former, and how to secure British crews for British ships, is the question. This difficulty thus far has only been met by inadequate and experimental attempts.

The British shipowner has an important voice in the discussion, and in the evidence referred to he has not hesitated to express his

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views. He embodies the demand, and has been quite explicit in stating the terms on which it can be met by supply. The Merchant Service of the twentieth century is no longer the destiny of the "fool of the family." There is no room aboard ship for fools, and equally the sea should provide no scope for knaves. When the foreigner is now manning our vessels it is not because shipowners desire alien crews, but because of a shortage of British sailors of an equally high standard of efficiency and physique. This is a lamentable truth, and unpalatable for an island nation whose sea-supremacy is a boast of the centuries, and it is none the less hard for being true. If British seamen offering were in sufficient number, and of a physical standard equal to the alien, the British shipowner would prefer his own compatriots. Failing this number and type, he, with a shrug, must find his men market abroad. Commerce, not sentiment, must be served. A reformatory is not the place from which the shipowner wishes to draw his crews. There may be, he acknowledges, and doubtless are, many individual cases when suitable sailors can be made from the unpromising material which has already been in the hands of the police, but, as a rule, he lays down that the moral dustbin is not the source from which he desires to recruit the sea-service. Reformatory lads have been tried and found wanting—as a class. This evidence is emphasised by those who have the actual handling of the material, the sea captains and ships' officers, whose experience cannot be gainsaid.

After the shipowners and the shipmasters speak the social reformer, the ratepayers, and the local authorities. Their testimony is to the effect that, if the lads from the street and alley can be taken young and trained just after schooling, and before the corrosive influence of their surroundings can permanently affect their characters, there is every hope that discipline and that best cure of all ills—work—can transform the otherwise predestined hooligan into a valuable asset of the Empire. The ratepayer can be saved from increase in his contribution towards the support of the unemployable and criminal (the two terms are in practice interchangeable, for the latter is only the former who has made use of opportunity), while the authorities and political reformers are saved the appalling responsibility which is theirs while no adequate machinery exists to turn the wastrels into worthy citizens. Most happily such a machinery does exist, a small one, it is true, laid down some six years ago, but capable at any time of extension both in capacity and output. It is a thoroughly efficient sea-training establishment on lines proved by experience to be the only adequate and practical ones. The fuel for this machine is necessarily funds, but the expense of equipment and maintenance

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is such a trifle as compared with the vast expenditure incurred by neglect of its provision as to be not worth consideration. The funds for the experimental stage, now past, and for the subsequent development of that one existing national institution which meets the necessities of the case, have been hitherto mainly provided by public generosity. The Government ought to help, as recommended by the Departmental Report, but they have done nothing. The local authorities have helped somewhat—Boards of Guardians by payment in respect of particular boys, and the Education Departments of several County Councils in respect of technical education.

To leave for the moment, however, the machine for the material. The three absolute requisites in the boys who are to be given their chance in sea-training instead of being wasted are, firstly, fitness of body, and, secondly, fitness of character. To these must be added fitness of training, for the sea requires efficiency. A lad, to become a good British seaman, must be without any physical defect, not be colour-blind, and must be up to a certain moderate standard of inches in height and chest commensurate with his age. On this last detail, however, it may here be added that nothing perhaps is more astonishing than the rapid bodily growth which takes place in a boy who, at his most critical period of physical development, is suddenly transplanted from a life of bad air, loitering, and unwholesome food to an educational routine, fresh air, healthy exercise, and good nutriment, unless it be his simultaneous mental improvement, due to discipline and an atmosphere of decent public opinion. After bodily fitness comes character. It is, of course, absurd to say that because a lad is unruly and "wild" he cannot be made into a reputable citizen. It is precisely that unruliness which means in so many cases a fine character, and one capable of much. Drake, Clive, and Nelson were unruly boys. But there is a far cry from exuberance of spirits to the kind of misconduct which leads to police action and magisterial sentence. It may be taken as a general rule that a boy who undergoes sentence has deserved it many times before he is caught. He is to some extent hardened, his self-respect has begun to be undermined, and his tendency is towards evil and not good, both in ways and companionship. These lads are still well worth the saving, but while there exist thousands of other lads, their contemporaries, who have suffered and withstood temptations, resisting the same inducements to wrong to which the former have succumbed, it is this latter class who first need, nay, deserve help, and it is these who should first be offered their opportunity. Many rescue homes exist for the ill-doer and for the maim, blind, and halt, but how few for the good and the fit who are without means! This is so much

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the case that instances occur where poor lads have intentionally committed theft or some merely technical offence under the eyes of the police in order to be convicted, and so find the only road, as they believe, towards sympathy and assistance. That this should be so is a pathetic and a dreadful thing.

It is then the poor healthy British boy of fair character, clear from the taint of conviction, whom the shipowner requires, but an untrained boy is of little use to him. Neither commerce nor the captains have time to school and train boys to be sailors, nor can shipowners afford to undertake the business. There is no room for the untrained youngster on a modern vessel, which is a dividend-earning unit in a shareholders' fleet, except in the cook's galley to peel potatoes, or on deck to polish brass. The desirable boy, the boy to be worth his wage and accommodation on board a ship, must be trained to obey orders, and in the elements of seamanship. If it is unsafe for a boy to be left alone among the passengers' or officers' cabins lest he should pilfer, he is not wanted at sea. If a boy cannot box the compass, heave the lead, splice a rope, take a turn at the wheel, and perform handily a hundred other minor sailor duties, he is equally not wanted. The kind of lad that is wanted can be supplied in sufficient numbers to supply British shipping with British seamen, and to maintain for all future time a sufficient supply. It is only a question of money and good management.

Having spoken of the material let us turn again to the machine. And, as it is always easier, as it is more practical, to deal with particulars than generalities, it will be well to discuss in some detail the scheme of modern sea-training as in actual being in a particular institution. For "The Lancashire and National Sea-Training Homes" on the Mersey it may be claimed that the controlling Board has solved the problem of how to find suitable lads, how to train them, and how to obtain for the trained boy good employment, and lastly, most important point of all, how to keep the young seaman at sea. The first essential to recognise is that it is only on the Mersey, the Thames and the Clyde that sea-training homes can be established and conducted to have a satisfying issue, for the sufficient reason that it is only at the ports on these great estuaries that the cardinal principle of meeting each boy on return from his first voyages can be carried out. Of this later. *Palmam qui meruit ferat.* Some six years ago the Liverpool branch of the Navy League took up the question of sea-training as the main phase of its activities, being urged to that course by the many shipowners of important lines who composed a large part of its Committee. Until 1908 the Institution was developed and managed by this Committee, but at this date it

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was recognised that it would be in the best interests of this national cause (sea-training) to frame the constitution of this nautical school anew on independent and separate lines. The old title of "The Lancashire Navy League" was retained, but the words "and National" were added, to necessarily emphasise the true scope of the work, which, from a mere local and county home, had in so short a time become a national organisation, intended to comprise in time many county homes on its excellent site. It was also highly desirable, for the sake of the funds of the work, to emphasise that the appeal for assistance was no less wide than the field of endeavour, while it was also wished to allow those to support the scheme, and the scheme alone, who hitherto had not wished to assist the work they so heartily approved of while it formed merely a part of a general propaganda.

It was suggested in the earlier days of the homes that it might be difficult to obtain a sufficient supply of suitable lads. This has been amply disproved, and the "waiting list" of lads hoping for admission is always lamentably long—"lamentably" because of the present lack of adequate accommodation.

The qualifications for admission are as simple and broad-minded as they should be. Any British boy between the ages of 14 to 16, who is physically fit for a sea life, is eligible without regard to his creed or parentage. An applicant for admission, if up to a moderate standard of growth (age 14, height, 4 ft. 9 in.; chest, 28–29 in.; age 14½, height, 4 ft. 10 in.; chest, 29–30 in.; age 15½, height, 5 ft. 1 in.; chest, 30–31 in.), fills in a simple form of application which is, with his birth-certificate, forwarded to the Superintendent, who, on the first vacancy occurring, arranges for the boy's medical examination. This proving satisfactory, the lad is bound apprentice under indenture for three years, his parents or guardians, if any, being required to concur.

Each lad is required to go to sea in the Mercantile Marine or Royal Navy (and may elect for either), at any time when the Board considers he is fit to do so. It may be taken as an average that a boy's period of training in the institution is at a minimum one year, but individual cases may vary according to age and ability. During the remaining period of the lad's indenture he goes on a succession of voyages, on ships found for him, thus concluding his training in the most practical way possible. In the case of boys who on leaving pass into the Royal Navy there is no further control exercised. Their career is settled and their future must depend on their efforts. But for boys who are the main output of the Homes, those who are to replace the alien and maintain the quality of British

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seamen, there is carried on the unique and beneficial system of, firstly, sending no lad to sea in a ship on which there is not separate accommodation as apart from the men in the fo'c'sle, and, secondly, of meeting each boy on his return from his voyages. This means that the young sailor when paid off from his ship is again taken back to the Homes. His sea-kit is put in order, he is protected from outside evil influences, and his money is banked for him. These boys find a home at the Homes until they are again found a ship and signed on, when the process repeats with each voyage until, at the end of a lad's indenture, he is set on his feet in his new life, is probably hoping for some promotion, and, in all human probability, will remain a sailor. This means that the boys do not drift back to their original hopeless conditions of living, and, in brief, that the labour and money expended on the scheme is not wasted—a system that can only be carried out on the Mersey, Thames and Clyde.

The mention of sea-kit brings out that both on admission and on passing out the lads receive a full and sufficient outfit, while the requisite specified above as to proper accommodation for "boys" aboard ship brings us to another objection which was raised on the founding of the establishment. It was then said that it might prove difficult to persuade shipowners to take the trained lads. Now no feature is more encouraging to the Board than to know that more applications for their boys, "the finished article," are received from shipowners than the Superintendent can supply. It might have been thought, as the Editor of the *Spectator* suggested in this connection, that shipowners would object to the condition as to providing suitable accommodation for the youngsters away from the men. This has not been the case. Shipowners have recognised the aims of the institution, and the excellence of the material turned out, and have been quick to acknowledge, not only the reasonableness, but the desirability of conforming to this one demand of the Board of the institution.

There may be appropriately quoted here what has been said on the subject by Mr. Alfred Booth, Chairman of the Cunard Company, in Liverpool Town Hall, 1909, on the quality of the boys furnished to his important line. He said: "Four years ago, in February, 1905, the Booth Line first took a few boys from the Homes, more or less as an experiment. We now have forty boys in our service, and 120 more have passed through our hands—all from this institution. I have a record here of these 120 boys so far as their service with us is concerned. First of all, it is worthy of note that no less than sixty-eight, or more than half, were promoted while with us to the rank of ordinary seamen, and four of these still further to the rank of A.B.

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While the number of A.B.'s may seem relatively small, I must ask you to remember that this record only began four years ago, and that three years' service at sea is required as the qualification of an able-bodied seaman. The promotion of sixty-eight boys to the position of ordinary seamen is, however, a notable proof that the Lancashire and National Sea-Training Homes have succeeded in their primary object —the efficient training of British seamen. We can analyse the records of these 120 boys in another way which is equally interesting. Twenty-seven are still in our service as ordinary seamen and one as A.B., making, with the forty boys, a total force from the Institution of sixty-eight. Fifteen left to join the Royal Navy, and five to enlist in the Army. Thirty-seven left to join other companies (shipping), and of these about half had already been promoted A.B. before leaving us (the Booth SS. Co.). Ten left owing to bad reports from their ships, thirteen left for one reason or another, eight proved to be unfit for tropical voyages, but are doing well elsewhere, one left to go to Canada, one for work ashore, and, finally, two died, one poor boy, I remember, being washed overboard in the Bay of Biscay. I think it will be agreed that these statistics constitute a record of which the institution may be proud. And now a word, in conclusion, on the experience gained in the last four years. First of all, the boys employed on one line of steamers should all come from one institution, for, apart from the obvious advantage from the administrative point of view of dealing only with one organisation, a certain amount of *esprit de corps* is engendered among the lads, which can only do good. A boy should be a full year at the Homes before joining a ship. The system whereby the boys go back to the Home between each early voyage, and take up again its wholesome discipline and healthy shore life, is of the greatest advantage both to the boys and to their employers. This cannot be done in the same way on a training-ship, and it is one of the reasons why I prefer the principle of a training-school on shore." No apology need be made for quoting this extract of an expression of opinion from one eminently qualified to speak. Mr. Booth's remarks go straight to the gist of the matter, and testify most fully to what has been said of this institution, whose whole history in its six short years of existence has been the providing of practical proofs of the need for such a work and of its complete efficacy.

Comparison is made, in the speech above, of training on land and training in the old-fashioned method on hulks. It may be noted that the Board of this institution was the first to grasp the importance of founding their Homes on land, a step which has been and is being followed by the Admiralty and by other sea-schools. From the point

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of view of the health of the boys alone, this measure has been fully justified. The Homes are at Liscard, on the Mersey, across the river from the great seaport of Liverpool, where the offices are situated, and the estuary offers every possible facility for every phase of nautical education. For the reason that more lines are running out from Liverpool, returning to the same port, than is the case either with London or Glasgow, it is obvious that the former is, of the three mentioned front doors of Britain, that at which the modern system of sea-training can best be carried out.

As to whether this institution, this machinery for turning probable wastrels into assets of Empire, is to continue its operations on the necessarily limited scale to which it is bound by insufficiency of funds is a matter for the public to decide. The Board of Management, in their determination to spend no penny of their finances, laboriously collected, on any other object than the work, are somewhat handicapped in an age when advertisement—expensive advertisement—is used as the mouthpiece of the social reformer no less than of the merchant; but it is encouraging to note that, in proportion as the work becomes known, slowly on its merits alone a response is made by all those who have time to reflect on its value to the nation and to the individual ratepayer. It must be equally satisfactory to the supporter of such a cause to reflect that all gifts, however small, however large, are entirely devoted to the work, and that there is no waste.

Although it would be interesting to follow the training of a lad step by step through his curriculum until his passing out either into the Merchant Service or into the Royal Navy as a first-class (if he is able to pass the somewhat severe tests) or second-class boy, or into the Royal Naval School of Music, into which many of the bandboys pass, space here does not permit. But it is hoped that enough has been said to interest a reader in "sea-training," and if this has been done, it can be promised that as full further information, on the subject in general, or on the methods of "The Lancashire (Navy League) and National Sea-Training Homes" in particular, as may be desired, will be sent immediately on application to the offices of that institution in Liverpool.

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PART II.

LIST OF BRITISH AND FOREIGN SHIPS.
ORDNANCE TABLES.

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PART II.

LIST OF BRITISH AND FOREIGN SHIPS.

THE following abbreviations are used throughout the Alphabetical List:—

a.c.	Armoured cruiser.	H.S.	Harveyised or similar hard-faced steel.
a.g.b.	Armoured gunboat.	K.S.	Krupp steel.
b.	Barbette ship.	shd.	Sheathed.
c.b.	Central-battery ship.	P.	Protected.
c.d.s.	Coast-defence ship.	*t.*	Turret-ship (in class column).
comp. (in armour column).	Compound or steel-faced armour.	*t.*	Speed and I.H.P. at trials (in speed and I.H.P. columns).
cr.	Cruiser.	to.cr.	Torpedo-cruiser.
d.v.	Despatch vessel.	to.g.b.	Torpedo-gunboat.
g.b.	Gunboat.		
g.v.	Gun-vessel.		

l. Light guns under 15 cwt., including boats' guns.
M. Machine guns.
sub. Submerged torpedo tube.
A. Armstrong guns. K. Krupp guns.

The following abbreviations are used to distinguish the various types of boilers:—

W.T.	Water-tube boilers, where the type is not known.	My.	Myabara.
B.	Belleville.	Nic.	Niclausse.
Bl.	Blechynden.	Nor.	Normand.
B. & W.	Babcock and Wilcox.	N.S.	Normand-Sigaudy.
D'A.	D'Allest.	R.	Reed.
D.	Dürr.	T.	Thornycroft.
E.	Earle.	T.S.	Thornycroft-Schulz.
Ex.	Express.	W.F.	White-Forster.
Du T.	Du Temple.	Y^1.	Yarrow small tube.
L.	Laird.	Y^2.	Yarrow large tube.
L.N.	Laird-Normand.	V.E.	Vickers Express.
M.	Mumford.	cyl.	Cylindrical.

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GREAT BRITAIN.—Armoured Ships.

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Makers of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
												Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.						£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	**Aboukir** shd.	12,000	440	69½	26½	21,375 B.	Govan	Fairfield	1900	1902	751,118	6–2 K.S.	3–1½	..	5 H.N.	6 K.S.	5	2 9·2-*in.*, 12 6-*in.*, 12 *12-pr.*, 5 *3-pr.*, 8 M., 2 l.	2	21·6 *t*	800 1600	755
a.c.	**Achilles** . .	13,550	480	73½	27	23,275 Y² & cyl.	Elswick	Hawthorn	1905	1907	1,191,103*	6–4–3 K.S.	¾–1	6	6	6	6	6 9·2-*in.*, 4 7·5-*in.*, 1 *12-pr.*, 29 *3-pr.*, 2 M.	3	23·27 *t*	1000	704
b.	**Africa** . .	16,350	425	78	26¾	18,698 I.D. & W. & cyl.	Chatham	J. Brown	1905	1906	1,461,429*	9 H.S.	2–1	8–7	12 H.S.	12–6 H.S.	7 K.S.	4 *12-in.*, 4 9·2-*in.*, 10 6-in., 14 *12-pr.*, 17 *3-pr.*, & M.	4	18·95 *t*	950 2150	781
b.	**Agamemnon** .	16,500	410	79½	27	17,285 Y²	Dalmuir	Hawthorn Leslie	1906	1908	1,651,289*	12–6 K.C.	2	8	8	12	7	4 *12-in.*, 10 9·2-*in.*, 24 *12-pr.*, & 5 M.	5	18·75 *t*	900 2500	865
b.	**Albemarle** .	14,000	405	75½	26½	18,296 B.	Chatham	Thames Ironworks	1901	1903	1,009,835	7–3 K.S.	2–1	7	7 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 12 6-*in.*, 12 *12-pr.*, 8 *3-pr.*, & M.	4	18·6 *t*	900 2000	750
b.	**Albion** . .	12,950	390	74	26	13,885 B.	Blackwall	Maudslay	1898	1902	858,745	6–2 H.N.	3–1	6	12–8 H.N.	12–6 H.N.	5 H.N.	4 *12-in.*, 12 6-*in.*, 12 *12-pr.*, 8 *3-pr.*, & M.	4	17·8 *t*	800 2300	700
a.c.	**Antrim** .	10,850	450	68½	25	21,604 Y. & cyl.	Clydeb'nk	J. Brown	1903	1905	906,335*	6–2 H.N.	2–¾	..	4½ H.N.	6 H.N.	6 H.N.	4 7·5-*in.*, 6 6-*in.*, 1 *12-pr.*, 22 *3-pr.*, 2 M.	2	23·02 *t*	800 1950	655
a.c.	**Argyll** .					21,190 I.D. & W. & cyl.	Greenock	Greenock Foundry	1904	1906	906,308*									22·38 *t*		
a.c.	**Bacchante** shd.	12,000	440	69½	26½	21,320 B.	Clydeb'nk	J. Brown	1901	1902	787,230	6–2 K.S.	3–1½	..	5 H.N.	6 K.S.	5	2 9·2-*in.*, 12 6-*in.*, 12 *12-pr.*, 5 *3-pr.*, 8 M., 2 l.	2	21·75 *t*	800 1600	755
a.c.	**Bedford** . .	9800	440	66	24½	22,457 B.	Govan	Fairfield	1901	1903	706,020	4–2 K.S.	2–¾	..	3 K.S.	4 K.S.	4 K.S.	14 6-*in.*, 8 *12-pr.*, 5 *3-pr.*, 2 M., 2 l.	2	22·7 *t*	800 1760	537

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b.	Bellerophon	18,600	490	82	27	23.000 B. & W.	Portsm'th	Fairfield†	1907	1909	1,765,312*	11 K.C.	..	..	..	11 K.C.	11 K.C.	10 *12-in*, 16 *4-in.*, 5 M.	3	21·80 *t*	900	870
a.c.	Berwick	9800	440	66	24½	22,681 Nic.	W. Beardmore & Co.	Humphrys	1902	1903	750,984	4–2 H.S.	2¾	..	5 N.S.	5–4 N.S.	4 N.S.	14 *6-in.*, 8 *12-pr.*, 5 *3-pr.*, 9 M.G.	2	23·61 *t*	800 / 1600	537
a.c.	Black Prince	13,550	480	73½	27	23,939 B. & W. & cyl.	Blackwall	Thames Ironworks	1904	1906	1,193,414*	6–4–3 K.S.	¾–1	6	6	6	6	6 *9·2-in.*, 10 *6-in.*, 25 *3-pr.*, 2 M.	3	23·65 *t*	1000 / 2000	704
b.	Britannia	16,350	425	78	26¾	18,725 B & W & cyl	Portsm'th	Humphrys	1904	1906	1,450,757*	9 H.S.	2–1	8–7	12 H.S.	12–6 H.S.	7 K.S.	4 *12-in.*, 4 *9·2-in.*, 10 *6-in.*, 14 *12-pr.*, 17 *3-pr.*, M.	4	18·74 *t*	950 / 2150	781
b.	Bulwark	15,000	400	75	26¾	15,000 B.	Devonp't	Hawthorn	1899	1902	997,846	9 H.S.	3–2	3 K.S.	12 H.S.	12–5 H.S.	6–2 K.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 8 *3-pr.*, & M.	4	18·15 *t*	900 / 2000	781
b.	Cæsar	14,900	390	75	27½	12,000	Portsm'th	Maudslay	1896	1897	885,212	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6 H.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 6 *3-pr.*, 2 M., 2 l.	5	18·7 *t*	900 / 2000	757
b.	Canopus	12,950	390	74	26	13,500 B.	Portsm'th	Greenock Foundry	1897	1899	866,516	6 H.N.	3–1	6 H.N.	12 H.N.	12–5 H.N.	5 H.N.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 8 *3-pr.*, & M.	4	18·5 *t*	800 / 1850	700
a.c.	Carnarvon	10,850	450	68½	25	21,489 Nic.&cyl.	Beardm're	Humphrys	1903	1905	890,840*	6–2 K.S.	2–¾	..	4½ K.S.	6 N.S.	6	4 *7·5-in.*, 6 *6-in.*, 1 *12-pr.*, 22 *3-pr.*, 2 M.	2	23·3 *t*	800	655
a.c.	Cochrane	13,550	480	73½	27	23,654 Y² & cyl	Govan	Fairfield	1905	1906	1,193,121*	6–4–3 K.S.	¾–1	6	6	6	6	6 *9·2-in.*, 4 *7·5-in.*, 1 *12 pr.*, 29 *3-pr.*, 2 M.	3	23·29 *t*	1000	704
b.	Collingwood	19,250	500	84	27	24,500 Y²	Devonp't	Hawthorn†	1908	1910	1,731,640*	10	¾–1¾	..	..	9–5	..	10 *12-in.*, 20 *4-in.*, 5 M.	3	21·5 *t*	900	724
b.	Colossus	20,000	510	85	27	25,000 B. & W.	Greenock	Scott†	Bldg.	..	..	..	..	..	..	..	..	10 *12-in.*, 16 *4-in.*	3	21	900	..
b.	Commonwealth	16,350	425	78	26¾	18,538 B & W & cyl	Govan	Fairfield	1903	1905	1,481,811*	9 H.S.	2–1	8–7	12 H.S.	12–6 H.S.	7 K.S.	4 *12-in.*, 4 *9·2-in.*, 10 *6-in.*, 14 *12-pr.*, 17 *3-pr.*, M.	4	19·01 *t*	950 / 2150	781
b.	Conqueror‡	22,500	545	88½	27½	27,000	Dalmuir	Beardmore	Bldg.	..	..	..	..	..	..	..	..	.. ..	..	21	..	..

* Total estimated cost of ship including guns.

† Turbine machinery.

‡ Particulars doubtful.

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GREAT BRITAIN.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost	Armour. Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	**Cornwall** . .	9800	440	66	24½	22,699 B. & W.	Pembroke	Hawthorn	1902	1905	756,274	4–2 H.S.	2–¾	..	5 N.S.	5–4 N.S.	4 N.S.	14 *6-in.*, 8 *12-pr.*, 5 *3-pr.*, 9 M.	2	23·68 *t*	800 1600	537
b.	**Cornwallis**	14,000	405	75½	26½	18,238 B.	Blackwall	Thames S. Co.	1901	1904	1,030,302	7 K.S.	2–1	7	14 K.S.	11–6 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 8 *3-pr.*, & M.	4	18·9 *t*	900 2000	750
a.c.	**Cressy** . shd.	12,000	440	69½	26½	21,240 B.	Govan .	Fairfield .	1899	1901	749,324	6 K.S.	3–2	..	5 K.S.	6 K.S.	5 K.S.	2 *9·2-in.*, 12 *6-in.*, 12 *12-pr.*, 5 *3-pr.*, 8 M., 2 l.	2	20·79 *t*	800 1600	755
a.c.	**Cumberland** .	9800	440	66	24½	22,000 B.	Glasgow	London & Glasgow Co.	1902	1904	718,168	4–2 K.S.	2–¾	..	5	5–4	4 N.S.	14 *6-in.*, 8 *12-pr.*, 5 *3-pr.*, 9 M.	2	23·68 *t*	800 1000	537
a.c.	**Defence** . .	14,600	490	74½	26	27,570 Y²	Pembroke	Scotts S. & E. Co.	1907	1909	1,383,744*	6–4	1–½	3	..	8	7	4 *9·2-in.*, 10 *7·5-in.*, 16 *12-pr.*, 5 M.	5	23.5 *t*	1000	755
a.c.	**Devonshire** .	10,850	450	68½	25	21,475 Nic. & cyl.	Chatham	Thames Ironworks	1904	1905	850,877*	6–2	2–¾	..	4½ K.S.	6 N.S.	6	4 *7·5-in.*, 6 *6-in.*, 1 *12-pr.*, 22 *3-pr.*, 2 M.	2	22·97 *t*	800 1600	655
b.	**Dominion** .	16,350	425	78	26¾	18,438 B. & W. & cyl.	Barrow .	Vickers .	1903	1905	1,455,190*	9 K.S.	2–1	8–7 K.S.	12 K.S.	12–6 K.S.	7	4 *12-in.*, 4 *9·2-in.*, 10 *6-in.*, 14 *12-pr.*, 17 *3-pr.*, M.	4	19·5 *t*	950 2150	781
a.c.	**Donegal** . .	9800	440	66	24½	22,173 B.	Govan .	Fairfield Co.	1902	1903	715,947	4–2 K.S.	2–¾	..	5 K.S.	5–4	4 K.S.	14 *6-in.*, 8 *12-pr.*, 5 *3-pr.*, 9 M.	2	23·56 *t*	800 1600	537
a.c.	**Drake** . .	14,100	500	71	26	31,450 B.	Pembroke	Humphrys	1901	1902	1,002,977	6 K.S.	3–2	..	5 K.S.	6–5 K.S.	5 K.S.	2 *9·2-in.*, 16 *6-in.*, 12 *12-pr.*, 5 *3-pr.*, 2 M.	2	24·11 *t*	1250 2500	900
b.	**Dreadnought**	17,900	490	82	26½	27,500 B. & W.	Portsm'th	Vickers† .	1906	1906	1,813,100*	11 K.C.	2¾–1¾	..	11	11–8	..	10 *12*-in., 24 *12-pr.* Q.F., 5 M.	5	21·85 *t*	900 2700	800
a.c.	**Duke of Edinburgh**	13,550	480	73½	27	23,685 B. & W. & cyl.	Pembroke	Hawthorn Leslie	1904	1906	1,201,687*	6–4–3 K.S.	¾–1	6	6	6	6	6 *9·2-in.*, 10 *6-in.*, 25 *3-pr.*, 2 M.	3	22·84 *t*	1000	704
b.	**Duncan** . .	14,000	405	75½	26½	18,222 B.	Blackwall	Thames S. Co.	1901	1903	1,023,147	7 K.S.	2–1	7	14 K.S.	11–6 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 8 *3-pr.*, & M.	4	18·9 *t*	900 2000	750

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b.	**Empress of India**		14,150	380	75	27½	13,000	Pembroke	Humphrys	1891	1893	846,321	18-5 *comp*	3	5	16 *comp.*	17–6 *comp.*	6–2 K.N.C.	4 *13·5-in.*, 10 *6-in.*, 16 *6-pr.*, 12 *3-pr.*, 2 M., 2 l.	3	18·0 *t*	900 / 1450	740
a.c.	**Essex**		9,800	440	66	24½	22,000 B.	Pembroke	J. Brown	1901	1903	736,557	4–2 K.S.	2–¾	..	5	5	4 K.S.	14 *6-in.*, 8 *12-pr.*, 5 *3-pr.*, 8 M., 2 l.	2	22·79 *t*	800 / 1600	537
a.c.	**Euryalus**	shd.	12,000	440	69½	26¼	21,318 B.	Barrow	Vickers	1901	1904	782,901	6 K.S.	3–2	2	5 K.S.	6 K.S.	5 K.S.	2 *9·2-in.*, 12 *6-in.*, 12 *12-pr.*, 5 *3-pr.*, 8 M.	2	21·63 *t*	800 / 1600	755
b.	**Exmouth**		14,000	405	75½	26½	18,346 B.	Birkenh'd	Laird	1901	1903	1,032,409	7 K.S	2–1	7	14 K.S.	11–6 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 8 *3-pr.*, & M.	4	19·0	900 / 2000	750
b.	**Formidable**		15,000	400	75	26¾	15,000 B.	Portsm'th	Earle	1898	1901	1,022,745	9 H.S.	3–2	2	12 H.S.	12–5	8 K.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 8 *3-pr.*, & M.	4	18·13 *t*	900 / 2000	781
b.	**Glory**		12,950	390	74	26	13,500 B.	Birkenh'd	Laird	1899	1901	841,014	6 H.N.	3–2	6 H.N.	12 H.N.	12–5 H.N.	5 H.N.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 8 *3-pr.*, & M.	4	18·12 *t* / 18·4 *t*	800 / 1850	700
b.	**Goliath**		12,950	390	74	26	13,500 B.	Chatham.	Penn	1898	1900	866,006											
a.c.	**Good Hope**		14,100	500	71	26	31,071 B.	Govan	Fairfield	1901	1902	990,759	6 K.S.	3–2	..	5 K.S.	6–5 K.S.	5 K.S.	2 *9·2-in.*, 16 *6-in.*, 12 *12-pr.*, 5 *3-pr.*, 2 M.	2	23·5 *t*	1250 / 2500	900
a.c.	**Hampshire**		10,850	450	68½	25	21,508 Y. & cyl.	Elswick	Hawthorn.	1903	1905	866,527*	6–2 K.S.	2–¾	..	5 K.S.	5–4 N.S.	..	4 *7·5-in*, 6 *6-in.*, 1 *12-pr.*, 22 *3-pr.*, 2 M.	2	23·47 *t*	800 / 1600	655
b.	**Hannibal**		14,900	390	75	27½	12,000	Pembroke	Harland	1896	1897	906,799	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6 H.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 6 *3-pr.*, 2 M., 2 l.	5	18·0 *t*	900 / 2200	757
b.	**Hercules** ‡		20,000	510	85	27	25,000 Y²	Jarrow	Palmer	Bldg.	..	..	..	..	..	..	..	..	10 *12-in.*, 16 *4-in.*	3	21	900	..
b	**Hibernia**	}	16,350	425	78	26¾	18,000 B.&W. & cyl.	Devonp'rt	Harland & Wolff	1905	1906	1,444,828*	9 H.S.	2-1	8–7	12 H.S.	12–6 H.S.	7 K.S.	4 *12-in.*, 4 *9·2-in.*, 10 *6-in.*, 14 *12-pr.*, 17 *3-pr.*, & M.	4	19·0 / 19·01 *t*	950 / 2150	781
b.	**Hindustan**	}					18,521 B.&W. & cyl.	Clydeb'nk	J. Brown	1903	1905	1,454,526*	9 K.S.	2–1	8–7	12 K.S.	12–6 N.S.	7 N.S.					
a.c.	**Hogue**	shd.	12,000	440	69½	26¼	21,432 B.	Barrow	Vickers	1900	1902	749,809	6 K.S.	3	2 H.S.	5 K.S.	6 K.S.	5 K.S.	2 *9·2-in.*, 12 *6-in.*, 12 *12-pr.*, 5 *3-pr.*, 8 M., 2 l.	2	22·6 *t*	800 / 1600	755
t.	**Hood**		14,150	380	75	27½	13,000	Chatham	Humphrys	1891	1893	849,252	18 *comp.*	3	5 *comp.*	17 *comp.*	18–6 *comp.*	6–2	4 *13·5-in.*, 10 *6-in.*, 10 *6-pr.*, 12 *3-pr.*, 2 M., 2 l.	3	17·5	900 / 1800	730

* Total estimated cost of ship including guns.

† Turbine machinery of Parsons type.

‡ Particulars doubtful.

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GREAT BRITAIN.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.	in.	in	in.	in.			knots.	tons.	
b.	**Illustrious**	14,900	390	75	27½	12,000	Chatham	Penn	1896	1898	894,585	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6 H.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 6 *3-pr.*, 2 M., 2 l.	5	16·5 *t*	900 / 2200	757
b.	**Implacable**	15,000	400	75	26¾	15,000 B.	D'port	Laird	1899	1902	989,116	9 K.S.	3–2	2	12 K.S.	12–5 K.S.	6	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 8 *3-pr.*, & M.	4	18·2 *t*	900 / 2000	781
b.	**Irresistible**						Chatham	Maudslay	1898	1901	1,048,136											
a.c.	**Invincible**	17,250	530	78½	26	41,000	Elswick.	Humph'ys†	1907	1909	1,768,995*	7-4 K.C.	..	..	..	8	..	8 *12-in.*, 16 *4-in.*, 5 M.	5	25‡	1000	731
a.c.	**Inflexible**						Clydeb'k	J. Brown †	1907	1908	1,728,229*											
a.c.	**Indomitable**						Govan .	Fairfield† .	1907	1908	1,761,080*											
a.c.	**Indefatigable**	18,750	555	80	26½	43,000	Devonp'rt	J. Brown †	1909	..	1,547,426*	..	..	..	..	..	..	8 *12-in.*, 16 *4-in.*	..	25	1000	..
b.	**Jupiter**	14,900	390	75	27½	12,000	Clydeb'nk	Thomson .	1895	1897	902,011	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 6 *3-pr.*, 2 M., 2 l.	5	18·4 *t*	900 / 2200	757
a.c.	**Kent**	9800	440	66	24½	21,000 B.	Portsm'th	Hawthorn	1900	1903	700,283	4–2 K.S.	2–¾	..	5 K.S.	5–4 N.S.	4 K.S.	14 *6-in.*, 8 *12-pr.*, 5 *3-pr.*, 8 M., 2 l.	2	21·7 *t*	800 / 1600	537
b.	**King Edward VII.**	16,350	425	78	26¾	18,138 B. & W. & cyl.	Devonp'rt	Harland .	1903	1905	1,473,245*	9 K.S.	2–1	8–7 K.S.	12 K.S.	12–6 N.S.	7	4 *12-in.*, 4 *9·2-in.*, 10 *6-in.*, 14 *12-pr.*, 17 *3-pr.*, M.	4	19·04 *t*	950 / 1200	781
a.c.	**King Alfred**	14,100	500	71	26	30,893	Barrow .	Vickers	1901	1903	978,125	6-5-4 K.S.	2½–1	..	5 K.S.	6-5 K.S.	5 K.S.	2 *9·2-in.*, 16 *6-in.*, 12 *12-pr.*, 5 *3-pr.*, 2 l.	2	23·46 *t* / 23·28 *t*	1250 / 2500	813
	Leviathan					31,203 B.	Clydeb'nk	J. Brown			1,012,959											
a.c.	**Lancaster**	9800	440	66	24½	22,000 B.	Elswick .	Hawthorn	1902	1904	732,858	4–2 K.S.	2–¾		5 K.S.	5–4 N.S.	4 K.S.	14 *6-in.*, 8 *12-pr.*, 5 *3-pr.*, 9 M.	2	24·01 *t*	800 / 1600	537
a.c.	**Lion**¶	26,350	660	88½	28	70,000	Devonport	Vickers† .	Bldg.	..	..	..	..	..	..	..	..	8 *12-in.*, 16 *4-in.*	..	28	..	..

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b.	**London**	15,000	400	75	26½	15,000 B.	Portsm'th	Earle	1899	1902	1,036,393	9 K.S.	3–2	2	12' K.S.	12–5 K.S.	6	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 8 *3-pr.*, & M.	4	18·1 *t*	900 / 2000	781
b.	**Lord Nelson**	16,500	410	79½	27	16,750 B. & W.	Jarrow	Palmer	1906	1908	1,654,098*	12-6 K.C.		8	8	12	..	4 *12-in.*, 10 *9·2-in.*, 24 *12-pr.*, 5 M.	5	18·9 *t*	900 / 2200	747
b.	**Magnificent**	14,900	390	75	27½	12,000	Chatham	Penn	1894	1895	908,789	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 6 *3-pr.*, 2 M., 2 l.	5	17·6 *t* / 17·9 *t* / 17·7 *t*	900 / 2200	757
b.	**Majestic**	14,900	390	75	27½	12,000	Portsm'th	Barrow	1895	1895	916,382											
b.	**Mars**	14,900	390	75	27½	12,000	Birkenh'd	Laird	1896	1897	902,402											
a.c.	**Minotaur**	14,600	490	74½	26	27,856 B. & W.	Devonp'rt	Harland & Wolff	1906	1908	1,438,065*	6–4	1–½	6	..	8	7	4 *9·2-in.*, 10 *7·5-in.*, 16 *12-pr.*, 5 M.	5	23·01 *t*	1000	755
b.	**Monarch**	22,500	545	88½	27½	27,000	Elswick	Hawthorn	Bldg.	..	..	..	..	..	..	..	..	.. ..	..	21	..	..
a.c.	**Monmouth**	9800	440	66	24½	22,000 B.	Glasgow	London & Glasgow	1901	1903	979,591	4–2 K.S.	2–¾	4 K.S.	5 K.S.	5–4 N.S.	4 K.S.	14 *6-in.*, 8 *12-pr.*, 5 *3-pr.*, 8 M., 2 l.	2	22·58 *t*	800 / 1600	537
a.c.	**Natal**	13,550	480	73½	27	23,592 Y[2] & Cyl.	Barrow	Shipbg.Co. Vickers	1905	1906	1,218,244*	6–4–3 K.S.	¾–1	6	6	6	6	6 *9·2-in.*, 4 *7·5-in.*, 1 *12-pr.*, 29 *3-pr.*, 2 M.	3	23·33 *t*	1000	704
b.	**Neptune**	20,000	510	85	27	25,000	Portsm'th	Harland & Wolff†	1909	..	1,728,449*	..	..	..	..	..	..	10 *12-in.*, 16 *4-in.*	3	21	900	..
b.	**New Zealand**	16,350	425	78	26¾	18,440 Nic. & Cyl.	Portsm'th	Humphrys	1904	1905	1,424,375*	9 K.S.	2–1	8–7 K.S.	12 K.S.	12–6 K.S.	7	4 *12-in.*, 4 *9·2-in.*, 10 *6-in.*, 14 *12-pr.*, 17 *3-pr.*, M.	4	18·59 *t*	950 / 2150	781
t.	**Nile**	11,940	345	73	27½	12,000	Pembroke	Maudslay	1888	1890	890,283	20–16 *comp.*	3	3	18–14 *comp.*	18 *comp.*	..	4 *13·5-in.*, *6 6-in.*, 22 *6-pr.*, *3-pr.*, & M.	3 (2 sub.)	16·7 *t*	900 / 1200	558
b.	**Ocean**	12,950	390	74	25½	13,500 B.	Devonport	Hawthorn	1898	1900	883,778	6 H.N.	2–1	6	12 H.N.	12–5 H.N.	5 H.N.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 8 *3-pr.*, & M.	4 (4 sub.)	18·74 *t*	800 / 1850	700
b.	**Orion**¶	22,500	545	88½	27½	27,000	Portsm'th	Wallsend†	Bldg.	..	..	..	..	..	..	..	..	.. ..	..	21	..	..
b.	**Prince George**	14,900	390	75	27½	12,000	Portsm'th	Humphrys	1895	1896	895,504	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 6 *3-pr.*, 2 l.	5	18·3 *t*	900 / 2200	757
b.	**Prince of Wales**	15,000	400	75	26¾	15,000 B.	Chatham	Greenock Foundry	1902	1904	1,114,079	9 K.S.	2–1	3	12 K.S.	12–6 N.S.	6–2 K.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 8 *3-pr.*, & M.	4	18·0	900	781

* Estimated cost of ship including guns. † Turbine machinery. ‡ Exceeded on trial. ¶ Particulars uncertain.

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GREAT BRITAIN.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
												Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.						£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	**Princess Royal**	..	..	..	..	..	Barrow .	Vickers .	Bldg.	..	..	..	..	..	..	..	..	.. . .	..	..	..	..
b.	**Queen** . .	15,000	400	75	26¾	15,000 B & W.	Devonport	Harland & Wolff	1902	1904	1,074,999	9 K.S.	2-1	3	12 K.S.	12-6 N.S.	6-2 K.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 8 *3-pr.*, & M.	4	18·39 *t*	900	781
b.	**Renown** . shd.	12,350	380	72	26¾	12,000	Pembroke	Maudslay	1895	1896	709,706	8-6 H.S.	3-2	..	10-6 H.S.	10 H.S.	6-2	4 *10-in.*, 10 *6-in.*, 12 *12-pr.*, 10 *3-pr.*, 2 M., 2 l.	5 (2 sub.)	18·75 *t*	900 / 1450	674
b.	**Ramillies** . .	14,150	380	75	27½	13,000	Glasgow	Thomson	1892	1893	902,600											
b.	**Repulse** . .	14,150	380	75	27½	13,000	Pembroke	Humphrys	1892	1894	851,474											
b.	**Resolution** .	14,150	380	75	27½	13,000	Jarrow .	Palmer .	1892	1893	875,522	18-5 *comp.*	3	5-4 N.S.	16 *comp.*	17 *comp.*	6-2 K.N.C.	4 *13·5-in.*, 10 *6-in.*, 16 *6-pr.*, 12 *3-pr.*, 2 M., 2 l.	3 (2 sub.)	17·5	900 / 1450	730
b.	**Revenge** . .	14,150	380	75	27½	13,000	Jarrow .	Palmer .	1892	1895	876,101											
b.	**Royal Oak** .	14,150	380	75	27½	13,000	Birkenh'd	Laird .	1892	1894	899,272											
b.	**RoyalSovereign**	14,150	380	75	27½	13,000	Portsm'th	Humphrys	1891	1892	839,136											
a.c.	**Roxburgh.** .	10,850	450	68½	25	22,102 D. & cyl.	Glasgow	London & Glasgow Company	1904	1905	862,077*	6-2 K.S.	2-¾	..	4½ K.S.	6 N.S.	6	4 *7·5-in.*, 6 *6-in.*, 1 *12-pr.*, 22 *3-pr.*, 2 M.	2	23·63 *t*	800 / 1600	655
b.	**Russell** . .	14,000	405	75½	26½	18,229 B.	Jarrow .	Palmer .	1901	1903	1,037,995	7 K.S.	2-1	7 K.S.	14 K.S.	11-6 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 8 *3-pr.*, & M.	4	19·3 *t*	900 / 2000	750
b.	**St. Vincent** .	19,250	500	84	27	24,500 B. & W.	Portsm'th	Scott's S.†	1908	1910	1,754,615*	10	¾-1¾	..	..	9-5	..	10 *12-in.*, 20 *4-in.* B.L., 5 M.	3	21·7 *t*	900	724
a.c.	**Shannon** . .	14,600	490	75½	25	28,553 Y²	Chatham	Humphrys	1906	1908	1,423,410*	6-4	1-½	3	..	8	..	4 *9·2-in.*, 10 *7·5-in.*, 16 *12-pr.*, 5 M.	5	22·49 *t*	950	755
a.c.	**Suffolk** . .	9800	440	66	24½	22,000 Nic.	Portsm'th	Humphrys	1903	1904	722,681	4-2 K.S.	2-¾	..	5 K.S.	5-4 N.S.	4 K.S.	14 *6-in.*, 8 *12-pr.*, 5 *3-pr.*, 9 M.	2	24·7 *t*	800 / 1600	537

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a.c.	**Sutlej**	shd.	12,000	440	69½	26¼	21,261 B.	Clydeb'nk	J. Brown	1899	1902	755,690	6 K.S.	3–2	..	5 K.S.	6 K.S.	5 K.S.	2 9·2-*in.*, 12 6-*in.*, 12 *12-pr.*, 5 *3-pr.*, 8 M., 2 l.	2	21·77 *t*	800 1600	755
b.	**Superb**		18,600	490	82	27	23,000 B. & W.	Elswick	Wallsend†	1907	1909	1,660,446*	11 K.C.	..	..	11 K.C.	11 K.C.	..	10 *12-in.*, 16 *4-in.* B.L., 5 M.	3	21·6 *t*	900	870
b.	**Temeraire**						23,000 Y²	Devonport	Hawthorn†	1907	1909	1,743,955*									22·07 *t*		
b.	**Swiftsure**		11,800	436	71	24½	12,500	Elswick	Humphrys, Tennant	1903	1904	845,036	7	3	7	..	10	7 K.S.	4 *10-in.*, 14 7·5-*in.*, 14 *14-pr.*, 2 *12-pr.*, 8 *6-pr.*, & M.	2	19·6 *t*	800 2000	700
b.	**Triumph**							Barrow	Vickers	1903	1904	845,479											
b.	**Thunderer**		22,500	545	88½	27½	..	Poplar	Thames Ironworks	Bldg.	..	..	..	..	..	..	..	..	.. ..	..	21	..	..
t.	**Trafalgar**		11,940	345	73	27½	12,000	Portsm'th	Humphrys	1887	1890	819,192	20–16 *comp.*	3	3	18–14 *comp.*	18 *comp.*	..	4 *13·5-in.*, 6 *6-in.*, 22 *6-pr.*, *3-pr.*, & M.	3 (2 sub.)	16·7 *t*	900 1200	572
b.	**Vanguard**		19,250	500	84	27	24,500 B. & W.	Barrow	Vickers†	1909	1910	1,607,781*	10	¾–1¾	8	..	9–5	..	10 *12-in.*, 20 *4-in.* B.L., 5 M.	3	22·1 *t*	900	724
b.	**Venerable**		15,000	400	75	26¾	15,345 B.	Chatham	Maudslay	1899	1902	1,092,753	7 K.S.	4–2½	3	14 K.S.	11–6 K.S.	6–2	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 8 *3-pr.*, & M.	4	18·3 *t*	900 2000	781
b.	**Vengeance**		12,950	390	74	26	13,500 B.	Barrow	Vickers	1899	1901	836,417	6 K.S.	2–1	6	12 K.S.	12–6 K.S.	5 K.S.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 8 *3-pr.*, & M.	4	18·5 *t*	800 1850	750
b.	**Victorious**		14,900	390	75	27½	12,000	Chatham	Hawthorn	1895	1897	885,212	9 H.S.	3–2½	9	14–9 H.S.	14–6 H.S.	6	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 6 *3-pr.*, 8 M., 2 l.	5 (4 sub.)	18·7 *t*	900 2200	757
a.c.	**Warrior**		13,550	480	73½	27	23,641 Y² & cyl.	Pembroke	Wallsend	1905	1907	1,186,395*	6–4–3 K.S.	¾–1	6	6	6	6	6 9·2-*in.*, 4 7·5-*in.*, 1 *12-pr.*, 29 *3-pr.*, 2 M.	3	22·9 *t*	1000	704
	5 Armoured ships‡		Details not published.					1 Portsmouth	Pro.															
	2 Armoured ships¶							1 Devonport																
								3 by contract.																

* Total estimated cost of ship, including guns. † Turbine machinery. ‡ Programme 1910–11. ¶ For Australia and New Zealand.

The battleships **Camperdown**, **Barfleur**, and **Centurion** have been struck out of the "fighting division of the Navy," but are available for "subsidiary purposes."

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GREAT BRITAIN.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
												Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
Scout. .	**Adventure** .	2940	374	38¼	13⅓	15,850 Y mod.	Elswick .	Hawthorn.	1904	1905	270,263	2	¾	10 *12-pr.*, 8 *3-pr.* .	2	25·42 *t*	150	268
P. 3rd cl. Cr.	**Æolus** . shd.	3600	300	43	17½	9000	Devonp'rt	Hawthorn.	1891	1893	213,180	2-1	2	2 *6-in.*, 6 *4·7-in.*, 13 *6-pr.*, *3-pr.*, M.	3	19·75	400 / 535	273
,, ,,	**Amethyst** . .	3000	360	40	14½	14,200 Y mod.	Elswick .	Parsons† .	1903	1905	228,426	..	..	12 *4-in.*, 11 *3-pr.*, M. .	2	23·42 *t*	300	296
P. 1st cl. Cr.	**Amphitrite** shd.	11,000	435	69	25¼	18,000 B.	Barrow .	Vickers .	1898	1900	552,795	4	3–6 H. S.	16 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 2 M.	2 (1 sub.)	20·75	1000	677
,, ,,	**Andromeda** shd.	11,000	435	69	25¼	16,500 B.	Pembroke	Hawthorn.	1897	1900	574,916	3–6	3–6 H.S.	16 *6-in.*, 12 *12-pr.*, 4 *3-pr.*, 2 M.	2	20·5	1000	600
,, ,,	**Argonaut** . shd.	11,000	435	69	25¼	18,000 B.	Govan .	Fairfield .	1898	1900	545,756	4	3–6 H. S.	16 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 2 M.	2 (1 sub.)	20·75	1000	677
,, ,,	**Ariadne** . shd.	11,000	435	69	25¼	18,000 B.	Clydeb'nk	J. Brown .	1898	1900	541,927							
P. 2nd cl. Cr.	**Arrogant** . .	5750	320	57½	21	10,000 B.	Devonp'rt	Earle .	1896	1898	279,248	1–2 N. S.	3 N.S.	10 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, M.	2	19·6	500	459
P. 3rd cl. Cr.	**Astræa** . shd.	4360	320	49½	19	9112	Devonp'rt	Devonport	1893	1894	254,217	2-1	3	2 *6-in.*, 8 *4·7-in.*, 1 *12-pr.*, 13 *6-pr.*, *3-pr.*, M.	3	19·75	400	312
Scout . .	**Attentive** . .	2940	374	38¼	13½	16,212 Y.	Elswick .	Hawthorn .	1904	1906	270,263	2	¾	10 *12-pr.*, 8 *3-pr.* .	2	25·88 *t*	150	268
P. 3rd cl. Cr.	**Barham** . .	1830	280	35	13¼	4700 T.	Portsm'th	Hawthorn .	1889	1890	113,702	2-1	2	6 *4·7-in.*, 6 *3-pr.*, M.	2	18·6	140	169

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P. 3rd cl. Cr.	**Bellona**		3360	385	41½	13½	18,700 Y.	Pembroke	Fairfield †	1909	1910	283,038*	½–1	..	6 *4-in.* B.L., and M.	3	25·9 *t*	450	263
„ „	**Blanche**		3360	385	41½	13½	18,000 Y.	Pembroke	Hawthorn†	1909	..	288,016	..	..	10 *4-in.* B.L. and M.	3	25	450	292
„ „	**Blonde**		3360	385	41½	13½	18,000 Y.	Pembroke	Cammell Laird†	Bldg.	..	284,697	..	..	10 *4-in.* B.L. and M.	3	25	450	292
„ „	**Boadicea**		3300	385	41	13½	18,500 Y.	Pembroke	J. Brown †	1908	1909	330,631*	½–1	..	6 *4-in.*, B.L. and M.	3	25·75 *t*	450	263
„ „	**Brilliant**	shd.	3600	300	43¾	17½	9164	Sheerness	Hawthorn.	1891	1893	218,145	2–1	2	2 *6-in.*, 6 *4·7-in.*, 13 *6-pr.*, *3-pr.*, M.	3	19·7	400	273
P. 2nd cl. Cr.	**Bristol**		4800	430	47	15¼	22,000 Y.	Clydeb'nk	J. Brown †	1910	..	367,671*	2–1	..	2 *6-in.*, 10 *4-in.* B.L., 1 *12-pr.*, 4 M.	2	25	800	376
P. 3rd cl. Cr.	**Cambrian**	shd.	4360	320	49½	19	9000	Pembroke	Hawthorn.	1893	1894	244,725	2–1	2	2 *6-in.*, 8 *4·7-in.*, 1 *12-pr.*, 13 *6-pr.*, *3-pr.*, M.	3	19·5	400	312
P. 2nd cl. Cr.	**Challenger**		5880	355	56	21¼	12,500 B.&W	Chatham	Wallsend Eng'ng Co.	1902	1904	360,194	3–2	..	11 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 2 M.	2	21·0	500	454
P. 3rd cl. Cr.	**Charybdis**	shd.	4360	320	49½	19	9000	Sheerness	Earle .	1893	1895	241,029	2–1	2	2 *6-in.*, 8 *4·7-in.*, 1 *12-pr.*, 13 *6-pr.*, *3-pr.*, M.	3	19·5	400	312
P. 2nd cl. Cr.	**Crescent**	shd.	7700	360	60	23¾	12,000	Portsm'th	Penn .	1892	1894	392,453	5–1	6	1 *9·2-in.*, 12 *6-in.*, 1 *12-pr.*, 19 *6-pr.*, *3-pr.*, M.	2 (1 sub.)	19·7	850	560
P. 2nd cl. Cr.	**Dartmouth**		5250	430	48½	15½	22,000	Barrow .	Vickers † .	Bldg.	..	..	..	..	8 *6-in.*, 4 *3-pr.*, 4 M. .	2	25	1000	380
P. 1st cl. Cr.	**Diadem**	shd.	11,000	435	69	26	16,500 B.	Govan .	Fairfield .	1896	1899	554,863	4–2½	4½–2	16 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 2 M.	2 (1 sub.)	20·5	1000	357
P. 3rd cl. Cr.	**Diamond**		3000	360	40	14½	10,066 N. L.	Birkenh'd	Laird .	1904	1905	231,010	..	..	12 *4-in.*, 11 *3-pr.*, M.	2	22·17 *t*	300	296

* Total estimated cost of ship including guns.

† Turbine machinery.

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GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
												Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
P. 2nd cl. Cr.	Diana . shd.	5600	350	54	21	9600	Govan .	Fairfield .	1895	1898	253,009	2½	3	11 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 5 M., 1 l.	3	19·5	550	449
„ „	Dido . . shd.	5600	350	54	21	9600	Glasgow .	London and Glasgow Co.	1896	1898	254,190							
„ „	Doris . shd.	5600	350	54	21	9600	Barrow .	Vickers .	1896	1898	256,306				2 (2 sub.)	19·5	550	449
„ „	Eclipse . shd.	5600	350	53	20¼	9600	Portsm'th	Portsm'th	1894	1897	276,313	1½–3	3	5 *6-in.*, 6 *4·7-in.*, 9 *12-pr.*, 1 *3-pr.*, 5 M., 1 l.	3	19·5	550	456
„ „	Edgar . .	7350	360	60	23¾	12,000	Devonp'rt	Fairfield .	1890	1893	410,980	5–1	6	2 *9·2-in.*, 10 *6-in.*, 2 *12-pr.*, 19 *6-pr.*, *3-pr.*, M.	4	20·5	850	544
„ „	Encounter .	5880	355	56	20¼	12,500 Dürr	Devonp'rt	Devonport Dockyard .	1903	1906	370,275	3–2	..	11 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 2 M.	2	20·75 to 21·0	600	454
„ „	Endymion .	7350	360	60	23¾	12,000	Hull .	Earle .	1891	1894	375,350	5–1	6	2 *9·2-in.*, 10 *6-in.*, 1 *12-pr.*, 19 *6-pr.*, *3-pr.*, M.	2	20·5	850	544
P. 1st cl. Cr.	Europa . shd.	11,000	435	69	26	16,500 B.	Clydeb'nk	Thomson .	1897	1899	564,690	4–2½	4½–2	16 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 2 M.	2	20·5	1000	357
P. 2nd cl. Cr.	Falmouth . .	5250	430	48½	15½	22,000	Dalmuir .	Breadmore	†Bldg.	..	..	..	..	8 *6-in.*, 4 *3-pr.*, 4 M.	2	25	1000	380
P. 3rd cl. Cr.	Flora . shd.	4360	320	49½	19	9000	Pembroke	Vickers .	1893	1895	242,276							
„ „	Forte. . shd.	4360	320	49½	19	9000	Chatham	Chatham .	1893	1895	240,571	2–1	2	2 *6-in.*, 8 *4·7-in.*, 1 *12-pr.*, 13 *6-pr.*, *3-pr.*, M.	3	19·5	400	312
„ „	Fox . . shd.	4360	320	49½	19	9000	Portsm'th	Portsm'th	1893	1895	245,571							

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Scout .	Foresight .		2945	360	39	14	14,277 T.	Govan .	Fairfield .	1904	1905	285,672	$1\frac{1}{2}$–$\frac{5}{8}$	..	14 *12-pr.* . .	2	25·12 *t*	150	268
„ .	Forward .						15,018 T.					285,326					25·15 *t*	380	
P. 2nd cl. Cr.	Furious .	shd.	5750	320	$57\frac{1}{2}$	21	10,000 B.	Devonp'rt	Earle .	1896	1899	275,158	1–2	3	10 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 5 M., 1 1.	2	19·0	500	459
„ „	Gibraltar .	shd.	7700	360	60	$23\frac{3}{4}$	12,000	Glasgow .	Napier .	1892	1894	373,236	5–1	6	2 *9·2-in.*, 10 *6-in.*, 1 *12-pr.*, 19 *6-pr.*, *3-pr.*, M.	2	19·7	850	544
„ „	Glasgow .	.	4800	430	47	$15\frac{1}{2}$	22,000 Y.	Govan .	Fairfield †	1909	..	357,003*	2–1	..	2 *6-in.*, 10 *4-in.*, 1 *12-pr.*, 4 M.	2	25	800	376
„ „	Gloucester .							Dalmuir	Beardmore†			356,172*							
„ „	Grafton . .		7350	360	60	$23\frac{3}{4}$	12,000	Blackwall	Humphrys	1892	1894	372,890	..	6	2 *9·2-in.*, 10 *6-in.*, 1 *12-pr.*, 19 *6-pr.*, *3-pr.*, M.	2	20·0	850	560
„ „	Hawke . .		7350	360	60	$23\frac{3}{4}$	12,000	Chatham.	Fairfield .	1891	1893	400,702	5–1	6	2 *9·2-in.*, 10 *6-in.*, 1 *12-pr.*, 19 *6-pr.*, *3-pr.*, M.	2	20·0	850	544
„ „	Hermes .	shd.	5600	350	54	$20\frac{1}{2}$	10,000 B.&W.	Govan .	Fairfield .	1898	1900 1902	281,776							
„ „	Highflyer	shd.	5600	350	54	$20\frac{1}{2}$	10,000 B.	Govan .	Fairfield .	1898	1900	280,182	$1\frac{1}{2}$–3	3	11 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 2 M.	2	20·0	600	456
„ „	Hyacinth .	shd.	5600	350	54	$20\frac{1}{2}$	10,000 B.	Glasgow .	London and Glasgow Co.	1898	1901	288,595							
P. 3rd cl. Cr.	Hermione	shd.	4360	320	$49\frac{1}{2}$	13	9000	Devonp'rt	Thomson .	1893	1895	223,324	2–1	2	2 *6-in.*, 8 *4·7-in.*, 1 *12-pr.*, 13 *6-pr.*, *3-pr.*, M.	3	19·5	400	312
T. G. B. .	Hussar . .		1070	250	$30\frac{1}{2}$	9	3500	Devonp'rt	Hawthorn.	1894	1895	72,313	..	2	2 *4·7-in.*, 5 *6-pr.*, M. .	5	19·0	100	120

* Total estimated cost of ship, including guns.

† Turbines.

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GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Makers of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
												Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
P. 2nd cl. Cr.	**Isis** . . shd.	5600	350	54	21	9600	Glasgow .	London and Glasgow Cc.	1896	1898	253,733	2½	3	11 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 5 M., 1 l.	3 (2 sub.)	19·5	550	449
„ „	**Juno** . shd.	5600	350	54	21	9600	Barrow .	Vickers .	1895	1898	256,106							
„ „	**Liverpool** . .	4800	430	47	15¼	22,000 Y.	Barrow .	Vickers† .	1909	..	347,158*	2–1	..	2 *6-in.*, 10 *4-in.* B.L., 1 *12-pr.*, 4 M.	..	25	800	376
3rd cl. Cr. .	**Medea** . .	2800	265	41	16½	7500 Y.	Chatham.	Humphrys	1888	1889 1905	171,874	..	1½	6 *4·7-in.*, 13 *6-pr.*, *3-pr.*, M.	4	19	400	218
P. 3rd cl. Cr.	**Melpomene** . (*ex*-Indefatigable) shd.	3600	300	43¾	17½	9000	Glasgow .	London and Glasgow Co.	1891	1892	183,568	2–1	2	2 *6-in.*, 6 *4·7-in.*, 13 *6-pr.*, *3-pr.*, M.	3	19·75	400	273
P. 2nd cl. Cr.	**Minerva** . shd.	5600	350	53	20½	9600	Chatham.	Chatham .	1895	1897	275,331	1½-3	3	11 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 5 M., 1 l.	3 (2 sub.)	19·5	550	416
„ „	**Newcastle** .	4800	430	47	15¼	22,000 Y.	E'swick .	Wallsend Engineering Co.†	1909	..	355,821*	2–1	..	2 *6-in.*, 10 *4-in.* B.L., 1 *12-pr.*, 4 M.	2	25	800	376
P. 1st cl. Cr.	**Niobe** . shd.	11,000	435	69	26	16,500 B.	Barrow .	Vickers .	1897	1899	548,283	4–2½	4½–2	16 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 2 M.	2 (2 sub.)	20·5	1000	600
P. Scout .	**Pathfinder**	3000	370	38¾	14	17,176 L.N.	Birknhd.	Laird .	1904	1905	273,147	½–⅝	..	10 *12-pr.*, 8 *3-pr.* .	2	25·34 *t*	150	268
„ .	**Patrol** .					16,460					273,523					25·06 *t*	380	

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P. 3rd cl. Cr.	Pandora		2200	305	36¾	13½	7000 T.	Portsm'th	Portsm'th	1900	1901	165,218							
„ „	Pegasus		2135	300	36½	17	7000 R.	Jarrow	Palmer	1897	1899	134,919							
„ „	Pelorus		2135	300	36½	17	7000 Nor.	Sheerness	Thomson	1896	1897	154,315							
„ „	Perseus		2135	300	36½	13½	7000 T.	Hull	Earle	1897	1901	133,461							
„ „	Pioneer		2200	305	36¾	13½	7000 T.	Chatham.	Fairfield	1899	1900	148,894	2	·22	8 *4-in.*, 11 *3-pr.*, M.	2	20·0	250 / 517	234
„ „	Prometheus		2135	300	36½	13½	7000 T.	Hull	Earle	1898	1901	131,743							
„ „	Psyche		2200	305	36¾	17½	7000 T.	Devonp'rt	Devonport	1898	1900	156,890							
„ „	Proserpine		2135	300	36½	17	7000 T.	Sheerness	Devonport	1896	1899	165,020							
„ „	Pyramus		2135	300	36½	13½	7000 R.	Jarrow	Palmer	1897	1900	135,249							
„ „	Philomel		2575	265	41	15½	7500	Devonp'rt	Earle	1890	1892	163,699	2–1	2	8 *4·7-in.*, 12 *3-pr.*, M.	2	19	300	217
P. 1st cl. Cr.	Powerful	shd.	14,200	500	71	29	25,000 B.	Barrow	Vickers	1895	1898	705,335	3–6	6	2 *9·2-in.*, 16 *6-in.*, 14 *12-pr.*, 14 *3-pr.*, M.	4	22·1	1500 / 3000	840
P. 2nd cl. Cr.	Royal Arthur	shd.	7700	360	60	27¾	12,000	Portsm'th	Maudslay	1891	1893	412,033	5–1	6	1 *9·2-in.*, 12 *6-in.*, 1 *12-pr.*, 19 *6-pr.*, *3-pr.*, M.	2 (2 sub.)	19·7	850	567
P. 3rd cl. Cr.	Sapphire		3000	360	40	14½	10,200	Jarrow	Palmer	1904	1905	226,277	..	..	12 *4-in.*, 11 *3-pr.*, M.	2	22·45 *t*	300	296
„ „	Sappho		3400	300	43	16½	9861	Poplar	Penn	1891	1893	176,813	2–1	2	2 *6-in.*, 6 *4·7-in.*, *6-pr.*, 13 *3-pr.*, M.	4	20·47	400	273
„ „	Scylla		3400	300	43	16½	9280	Poplar	Penn	1892	1893	176,655	2–1	2		4	20·62	400	273
P. Scout	Sentinel		2940	360	40	14½	17,488 Nor. V.E.	Barrow	Vickers	1904	1905	276,837	1½–⅝	..	10 *12-pr.*, 8 *3-pr.*	2	25·07 *t*	150 / 410	268

* Total estimated cost of ship, including guns.

† Turbine machinery.

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GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
												Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
P. 3rd cl. Cr.	**Sirius** . shd.	3600	300	43¾	17½	9000	Elswick .	Maudslay .	1890	1892	190,991	2–1	2	2 *6-in.*, 6 *4·7-in.*, 13 *6-pr.*, *3-pr.*, M.	4	19·75	400	273
P. Scout .	**Skirmisher** .	2940	360	40	14¼	17,053 Nor.	Barrow .	Vickers .	1905	1905	276,579	1½–⅝	..	10 *12-pr.*, 8 *3-pr.* .	2	25·19	150	268
P. 1st cl. Cr.	**Spartiate** . shd.	11,000	435	69	26	18,658	Pembroke	Maudslay .	1898	1902	654,661	4–2½	4½–2	16 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 2 M.	2 (2 sub.)	21·0 *t*	1000	600
T. B. D. .	**Swift.** . .	1800	345	34⅙	10½	30,000 L.Y.	Birkenh'd	Cammell Laird	1907	1909	241,595*	..	..	4 *4-in.* . . .	..	35·25	180 Oil	150
P. 2nd cl. Cr.	**Talbot** . shd.	5600	350	53½	21	9600	Devonpr't	Devonport	1895	1897	263,699	1½–3	3	11 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 5 M., 1 l.	3 (2 sub.)	19·5	550	412
P. 3rd cl. Cr	**Terpsichore** .	3400	300	43	16½	9000	Glasgow .	Thomson .	1890	1892	176,616	2–1	2	2 *6-in.*, 6 *4·7-in.*, 13 *6-pr.*, *3-pr.*, M.	3	20·0	400	275
P. 1st cl. Cr.	**Terrible** . shd.	14,200	500	71	27	25,000 B.	Glasgow .	Thomson .	1895	1898	708,619	3–6	6	2 *9·2-in.*, 16 *6-in.*, 14 *12-pr.*, 14 *3-pr.*, 9 M.	4	22·4	1500/3000	840
P. 2nd cl. Cr.	**Theseus** . .	7350	360	60	23¾	12,000	Blackwall	Maudslay .	1892	1894	370,359	5–1	6	2 *9·2-in.*, 10 *6-in.*, 1 *12-pr.*, 19 *6-pr.*, *3-pr.*, M.	2 (2 sub.)	20·0	850	544
P. 3rd cl. Cr.	**Topaze** . .	3000	360	40	14½	9860 L.N.	Birkenh'd	Laird .	1903	1905	242,444	..	..	12 *4-in.*, 11 *3-pr.*, M.	2	22·1 *t*	300	296
P. 2nd cl. Cr.	**Venus** . shd.	5600	350	54	21¼	9600	Govan .	Fairfield .	1895	1898	254,184	2½	3	11 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 5 M., 1 l.	3 (2 sub.)	19·5	550	449
„ „	**Vindictive** .	5750	320	54	20½	10,000 B.	Chatham	Chatham .	1897	1897	282,879	1–2 N.S.	3	10 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 5 M., 1 l.	2	20·1	500	429

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P. 2nd cl. Cr.	Weymouth	5250	430	48½	15½	22,000	Elswick	Parsons†	Bldg.	..	..	..	..	8 6-*in.*, 4 3-*pr.*, 4 M.	2	25	1000	380
„ „	Yarmouth						Glasgow	London & Glas. Co.†										
	5 Bristol Type	Details not published.‡					..	..	Pro.	..	..	..	..	..	..	..	..	..

* Total cost, including guns. † Turbine machinery. ‡ Programme 1910–11.

River Gunboats.—**Robin, Nightingale, Snipe, Sandpiper** (1897), 85 tons; **Woodcock, Woodlark** (1898), 150 tons, 2 6-prs., 4 Maxims; **Kinsha** (1901), 616 tons, **Teal, Moorhen** (1902), 180 tons, 2 6-prs., 13 knots; **Widgeon** (1905), 195 tons. *Despatch Vessels.*—**Alacrity** and **Surprise** (1885), 1,700 and 1,650 tons. *Torpedo Gunboats* (some serving as mine sweepers).—**Circe, Dryad, Halcyon, Harrier, Jason, Leda, Niger, Seagull, Skipjack, Spanker, Speedwell,** and **Speedy.**

The following vessels have been struck off the effective list, but the armaments have not in every case been removed:—*3rd Class Cruisers:* **Melampus, Pique, Retribution, Spartan,** and **Tribune,** which were built under the Naval Defence Act, and **Pactolus.** *Torpedo-Gunboat:* **Antelope** (Fishery P.). The following small craft have been placed on a "Special Service List" of "unprotected ships": **Sphinx, Lapwing, Redbreast** (East Indies), **Ringdove** (Fishery P.), **Pomone** (special service), **Dwarf** (W. C. Africa), **Shearwater** (British Columbia), **Bramble, Britomart, Thistle, Clio,** and **Cadmus** (China).

The following vessels are employed on special service:—**Assistance** and **Cyclops,** fleet repair ships: **Blake, Blenheim, Hecla, Leander, St. George,** and **Tyne,** torpedo depôt ships; **Bonaventure, Forth, Mercury, Thames, Vulcan, Dolphin, Onyx, Hebe, Sharpshooter,** and **Hazard,** submarine depôt ships; **Aquarius,** distilling vessel; **Iphigenia, Apollo, Naiad, Intrepid, Andromache, Latona,** and **Thetis,** mine-laying vessels; and **Circe** and **Gossamer,** mine-sweepers; **Seaflower, Seamew, Sparrow,** and **Spider,** steam-trawlers for mine-sweeping duties, purchased April, 1909.

Royal Naval Reserved Merchant Cruisers.

—	Name.	Owners.	Length.	Breadth.	Draught of Water for the Admiralty List.	Gross Tonnage.	Indicated Horse-Power.	Ocean Speed.
			Feet.	Feet.	Feet.	Tons.		Knots.
Ships in receipt of an annual subvention and permitted to fly the blue ensign.	**Mauretania**	Cunard Co.	785	88	33·6	38,000	68,000*	26·6* *t*
	Lusitania	„	785	88	33·6	38,000	68,000*	26·6* *t*

* Speed of best day's run, 1910.

In addition to the above, the Cunard Company holds all vessels for the time being the property of the Company at the disposal of His Majesty's Government for hire or purchase.

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ARGENTINE REPUBLIC.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
c.b.	**Almirante Brown**	4267	240	50	20½	4500	Poplar	1880	1882	270,000	9 *comp.*	1½	8 *comp.*	7 *comp.*	8 *comp.*	..	10 *5·9-in.* (Canet), 4 *4·7-in.*, 8 *2·4-in.*, 2 M.	..	13·75 *t*	650	350
a.c.	**Garibaldi**	6732	328	59¾	24	13,384	Sestri Ponente	1895	1896	752,000	6–3 H.S.	1½	6 H.S.	6 H.S.	6 H.S.	6 H.S.	2 *10-in.*, 10 *6-in.*, 6 *4·7-in.*, 10 *2·2-in.*, 10 *1·4-in.*, 2 M.*	..	19·9 *t*	1000	500
a.c.	**General Belgrano**	7069	328	59¾	24	13,000	Leghorn	1897	1899	696,700	6–3 H.S.	1½	6 H.S.	6 H.S.	6 H.S.	6 H.S.	2 *10-in.*, 14 *6-in.*, 2 *3-in.*, 10 *2·2-in.*, 8 *1·4-in.*, 2 L., 2 M.*	4	20·1 *t*	1000	500
a.c.	**General San Martin**	6773	328	59¾	24	13,000	Leghorn	1896	1898	688,200	6–3 H.S.	1½	6 H.S.	6 H.S.	6 H.S.	6 H.S.	4 *8-in.*, 10 *6-in.*, 6 *4·7-in.*, 12 *2·2-in.*, 10 *1·4-in.*, 2 L., 2 M.*	4	19·8	1100	500
c.d.s.b.	**Independencia**	2336	230	44½	13	3000	Birkenhead	1891	1893	176,000	8 *comp.*	2	..	8 *comp.*	8 *comp.*	..	2 *9·4-in.*, 4 *4·7-in.* (A), 4 *3-pr.* (A), 4 M.	..	14·4 *t*	340	225
c.d.s.b.	**Libertad**	2336	230	44½	13	3000	Birkenhead	1890	1892	176,000											
b.	**Moreno**	28000	578	95¾	27½	39,500 B. & W. Curtist.	Quincy, Mass.	Bldg	..	2,200,000	12–10 K.S.	3–2	9–6 K.S.	9 K.S.	12–8 K.S.	6 K.S.	12 *12-in.*, 12 *6-in.*, 16 *4-in.*, 10 smaller.	2 sub.	21	1600 4000	960
	Rivadavia						Camden, N.J. (N.Y.S. Co.)														
a.c.	**Pueyrredon**	6773	328	59¾	24	13,000 B.	Sestri Ponente	1898	1901	782,000	6–3 H.S.	1½	6 H.S.	5 H.S.	6 H.S.	6 H.S.	2 *10-in.*, 10 *6-in.*, 6 *4·7-in.*, 10 *2·2-in.*, 10 *1·4-in.*, 2 M.*	4	20·1 *t*	1000	500

* Garibaldi, General San Martin, General Belgrano and Pueyrredon have Armstrong guns.

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ARGENTINE REPUBLIC.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
cr. . .	**Buenos Aires** shd.	4780	396	47¼	19	17,000	Elswick .	1895	1895	383,000	..	4½	2 *8-in.* (A.), 4 *6-in.*, 6 *4·7-in.*, 16 *3-pr.*, 6 *1-pr.*	3	23·2* *t*	1000	429
to.g.b. .	**Espora** . .	520	210	25	8	3500 Y	Birkenhead .	1890	1891	..	..	..	2 *3-in.*, 4 *1·8-in.*, 2 M. . .	5	20·0	180	124
cr. . .	**Nueve de Julio**	3570	354	44	19½	14,350	Elswick .	1892	1892	293,000	4½	4½	4 *6-in.* (A.), 8 *4·7-in.*, 12 *3-pr.*, 12 *1-pr.*	5	22·74 *t*	770	300
to.g.b. .	**Paraná** . .	1000	240	32¼	7½	..	Elswick .	1908	1909	..	1	3–2†	2 *6-in.* Howitzers, 6 *12-pr.*, 8 M., 4 *12-pr.* field.	..	15·0	120	150
cr. . .	**Patagonia** .	1419	220	32¾	12¾	2400	Trieste .	1885	1887	100,000	1½	4	1 *10-in.*, 3 *6-in.*, 6 l., 10 M. .	5	13·0	350	210
to.g.b. .	**Patria** . .	1070	250	31	10	4500	Birkenhead .	1893	1894	87,000	..	..	2 *4·7-in.*, 4 *8-pr.*, 2 *3-pr.*, 2 M.	5	20·75 *t*	288	159
to.g.b. .	**Rosario** . .	1000	240	32¼	7½	..	Elswick .	1908	1909	..	1	3–2†	2 *6-in.* Howitzers, 6 *12-pr.*, 8 M., 4 *12-pr.* field.	..	15·0	120	150
cr. . .	**25 de Mayo** .	3200	325	43	16	13,800	Elswick .	1890	1892	260,000	4½	4½	2 *8·2-in.* (A.), 8 *4·7-in.*, 12 *3-pr.*, 12 *1-pr.*	6	22·43 *t*	600	185

* Natural draught. † Side.

The training-ship (cruiser) Presidente Sarmiento, 2750 tons, 2000 I.H.P. (locomotive and Niclausse boilers), and 13 knots speed, with 19 guns and three torpedo tubes; launched by Messrs. Laird, 1897. There are several other small gunboats. The torpedo-ram Maipù (1063 tons, 1750 I.H.P.) was built in England in 1880.

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AUSTRIA-HUNGARY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.'	Armour. Belt.	Deck.	Side above belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	Arpád Babenberg	8208	354½	65¾	23¼	15,000 B.	Trieste	1901 1902	1903 1904	650,900 667,000	8½ K.S.	2½	4 K.S.	8 K.S.	8½ K.S.	5 K.S.	3 *9·4-in.*, 12 *5·9-in.*, 10 *2·8-in.*, 8 M., 2 l.	2 (sub)	19·6 *t*	500 840	638
c.d.s.	Budapest	5462	305	55¾	21	9185 B.	Trieste	1896	1897	400,600	10½ H.S.	2½	3¼ H.S.	8 H.S.	10½ H.S.	3¼ H.S.	4 *9·4-in.*, 6 *5·9-in.*, 12 *1·8-in.*, 6 M., 2 l.	4	17·8 *t*	500	450
b. *b.* *b.*	Erz. Friedrich Erz. Karl Erz. Ferdinand Max	10433	390½	72¼	24½	18,130 *t.* 18,000 Y.	Trieste	1904 1903 1905	1906 1906 1907	912,500	8¼ K.S.	3	5 K.S.	8 K.S.	9¼ K.S.	7 K.S.	4 *9·4-in.*, 12 *7·5-in.*, 12 *2·8-in.*, 6 *1·8 in.*, 8 M., 2 l.	2 sub.	20·56 *t* 20·36 *t* 20·0	1315	..
b.	Erz. Franz Ferdinand	14226	450¾	80½	26½	20,000 Y.	Trieste	1908	..	..	9–7½ K.S.	2	6 K.S.	6 K.S.	10 K.S.	8 K.S.	4 *12-in.*, 8 *9·4-in.*, 20 *3·9-in.*, 6 *12-pr.*, 2 M.	3 sub.	20·5	750 1200	816
b.	Habsburg	8208	354½	65¾	23¼	15,000 B.	Trieste	1900	1902	626,000	8½ H.S.	2½	4 H.S.	8 H.S.	8¼ H.S.	5 H.S.	3 *9·4-in.*, 12 *5·9-in.*, 10 *2·8-in.*, 8 M., 2 l.	2 (sub)	19·6 *t*	500 840	638
a.c	Kaiserin Maria Theresia	5187	351	52½	21¼	9755	Trieste	1893	1895 1910	304,187	4	2	..	4	4	4	2 *7·5-in.*, 8 *5·9-in.*, 2 *2·8-in.*, 14 *1·8-in.*, 5 M., 2 l.*	4	19·0	740	502
a.c	Kaiser Karl VI.	6151	367½	56	20¼	12,800 B.	Trieste	1898	1900	429,000	10 H.S.	1½	6 H.S.	8 H.S.	8¾ H.S.	6 H.S.	2 *9·4-in.*, 8 *5·9-in.*, 16 *1·8-in.*, 4 M., 2 l.	4	20·7 *t*	800	535
c.d.s.	Monarch	5550	305	55¾	21	8900	Pola	1895	1898	399,062	10½ H.S.	2½	3¼ H.S.	8 H.S.	10½ H.S.	3¼ H.S.	4 *9·4-in.*, 6 *5·9-in.*, 12 *1·8-in.*, 6 M., 2 l.	4	17·4 *t*	500	450
b.	Radetzky	14226	450¾	80½	26½	20,000 Y.	Trieste	1909	..	..	9–7½ K.S.	2	6 K.S.	6 K.S.	10 K.S.	8 K.S.	4 *12-in.*, 8 *9·4-in.*, 20 *3·9-in.*, 6 *12-pr.*, 2 M.	3 sub.	20·5	750 1200	816
a. c.	St. Georg	7185	383¾	61¾	21¼	15,270 *t*, Y.	Pola	1903	1906	581,583	8¼–6½ K.S.	1½	5 K.S.	7 K.S.	8¼–5½ K.S.	6 K.S.	2 *9·4-in.*, 5 *7·5-in.*, 4 *5·9-in.*, 9 *2·8-in.*, 14 M., 2 l.	2 (sub)	22 *t*	1000	..
c.d.s.	Wien	5550	305	55¾	21	8480	Trieste	1895	1897	397,850	10½ H.S.	2½ H.S.	3¼ H.S.	8 H.S.	10½ H.S.	3¼ H.S.	4 *9·4-in.*, 6 *5·9-in.*, 12 *1·8-in.*, 6 M., 2 l.	4	17·6 *t*	500	450
b.	Zrinyi	14226	450¾	80½	26½	20,000 Y.	Trieste	1910	..	..	9–7½ K.S.	2	6 K.S.	6 K.S.	10 K.S.	8 K.S.	4 *12-in.*, 8 *9·4-in.*, 20 *3·9-in.*, 6 *12-pr.*, 2 M.	3 sub.	20·5	750 1200	816

Six armoured river monitors, Bodrog, Körös, Leitha, Maros, Szamos, and Temes, of 300–437 tons displacement.
Four battleships of 20,000 tons projected, to cost about £2,360,000 each.

* New armament.

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AUSTRIA-HUNGARY.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
to. cr. .	Admiral Spaun* .	3500	416¾	42	15½	20,000 Y. tur.	Pola	1909	..	..	1	..	7 *3·9-in.*, 2 M. . . .	2	26·0	..	..
to. cr. .	Aspern . . .	2362	301¾	39½	14½	7300 Y	Pola	1899	1901	155,000	2	..	8 *4·7-in.*, 8 *1·8-in.*, 4 M. .	1	20·0	470/500	289
to. g. b. .	Blitz . . .	354	193½	22½	8	3500	Elbing	1888	1889	..	..	..	8 *1·8-in.*	4	21·0	250	59
cr. 2nd cl. .	Kaiserin Elizabeth	4000	321½	47½	18½	8000	Pola	1890	1892	..	2½	3½	2 *9·4-in.* (K.), 6 *5·9-in.* do., 13 *1·8-in.*, 4 M., 2 l.	5	19·0	660	418
cr. 2nd cl. .	Kaiser Franz Josef I.	3966	321½	47½	18½	8000	Trieste	1889	1891	..	2½	3½	2 *9·4-in.* (K.), 6 *5·9-in.* do., 16 *1·8-in.*, 2 l.	5	19·0	660	426
to. g. b. .	Komet . . .	354	193½	22½	8	3500	Elbing	1888	1889	..	..	..	9 *1·8-in.*	4	21·0	50	59
cr. 3rd cl. .	Leopard. . .	1506	224	34	14	6000	Elswick	1886	1888	200,000	..	..	2 *4·7-in.*, 10 *1·8-in.* . .	4	18·3	250	186
to. g. b. .	Magnet . . .	502	220	26¾	8	5000 T	Elbing	1896	1899	51,052	..	..	6 *1·8-in.*	3	26·0 *t*	105	80
to. g. b. .	Meteor . . .	344	187	22½	8	3500	Elbing	1887	1889	..	..	..	9 *1·8-in.*	4	23·1	120	59
cr. 3rd cl. .	Panther. . .	1506	224	34	14	6000	Elswick	1885	1887	..	..	..	2 *4·7-in.*, 10 *1·8-in* . .	1	18·5	250	186
T. D. S. .	Pelikan . . .	2431	279	39½	15½	4600	Elbing	1891	1893	..	..	..	2 *5·9-in.* (K.), 8 smaller .	4	18·0	..	198
to. g. b. .	Planet . .	492	210	23	8½	3500	Jarrow	1889	1890	..	..	..	2 *2·8-in.*, 8 *1·8-in.* . .	3	19·6	78	84
to. g. b. .	Satellit . . .	531	220	26¾	9½	4000	Elbing	1893	1893	..	1½	..	1 *2·8-in.*, 8 *1·8-in.* . .	..	21·87	76	84
to. cr. .	Szigètvár . .	2313	301¾	39½	14½	7300 Y.	Pola	1899	1901	155,000	2	..	8 *4·7-in.*, 8 *1·8-in.*, 4 M. .	1	20·0	470/500	289
to. g. b. .	Trabant. . .	522	220	23	8½	3500	Trieste	1890	1891	..	..	..	2 *2·8-in.*, 8 *1·8-in.* . .	3	20·0	..	84
to. cr. .	Zenta . . .	2264	301¾	39½	12½	7300 Y.	Trieste	1897	1899	143,780	2	..	8 *4·7-in.*, 8 *1·8-in.*, 4 M. .	1	20·9 *t*	470/500	289

* 2½ in. side armour and 2 in. bulkhead.

Four screw gunboats, between 540 and 870 tons displacement and 250 and 950 indicated horse-power.
Donau, training corvette, launched at Pola, 1893 (2307 tons).

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BRAZIL.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Deck.	Side above Belt.	Bulkheads.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal	Complement.
c.d.s., t.	**Marshal Deodoro**	tons.	ft.	ft.	ft.					£	in.	in.	in	in.	in.	in.			knots.	tons.	
c.d.s., t.	**Marshal Floriano**	3112	267½	48	13¼	3400 D'A.	La Seyne	1898 / 1899	1900 / 1901	..	13¾–4 H.S.	1½	..	..	8 H.S.	3 H.S.	2 *9·4-in.*, 4 *4·7-in.*, 2 M., 4 *6-pr.*, 2 *1-pr.*	2 (sub.)	15·0	236	**200**
b.	**Minas Geraes**	19,281	500	83	25	27,212 t / 24,500 B.&W.	Elswick	1908 / Bldg.	1909 / ..	1,821,400	9–6–4 K.S.	2	9–6–4 K.S.	9	12–8 K.S.	9 K.S.	12 *12-in.*, 22 *4·7-in.*, 8 *3-pr.*	..	21·4 *t* / 21·0	900 / 2400	**900**
b.	**Rio de Janeiro**																				
t.	**Riachuelo** shd.	5700	305	52	19½	7300	Poplar	1883 / 1895	1888	365,000*	11 *comp.*	2	..	10 *comp.*	10 *comp.*	..	4 *9·2-in.* (Whitworth, altered by Armstrong), 6 *4·7-in.*, 23-*pr.*, 15 M.	5	16·71	800	**450**
b.	**São Paulo**	19,281	500	83	25	24,500 B.&W.	Barrow	1909	1910	1,821,400	9–6–4 K.S.	2	9–6–4 K.S.	9	12–8 K.S.	9 K.S.	12 *12-in.*, 22 *4·7-in.*, 8 *3-pr.*	..	21·0	900 / 2400	**900**

*. Exclusive of guns and ammunition.

Also river monitors Maranhao and Pernambuco, built at Rio de Janeiro. Two armoured gunboats projected. Two monitors, 335 tons.

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BRAZIL.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
cr.	**Almirante Tamandare** shd.	4660	294	46	18¼	7500	Brazil .	1890	1893	..	1½	3	10 *6-in.*, 2 *4·7-in.*, 8 M. .	8	17·0	750	450
,,	**Andrada** . . . shd.	2559	252¾	34	18	3600	Bergen .	1890	1892	..	..	..	2 *4·7-in.*, 2 *14-pr.*, 6 *6-pr.*, 6 *1-pr.*	5	17·0	..	300
,,	**Bahia**	3100	380	39	13½	17,500 tur.	Elswick .	1909	1910	328,500	¾–1½	..	10 *4·7-in.*, 8 *1·8-in.*	2	26·5	650	260
,,	**Barroso** . . . shd.	3600	330	43¾	16¾	7500	Elswick .	1896	1897	..	3	4½ shields	6 *6-in.*, 4 *4·7-in.*, 10 *6-pr.*, 4 *1-pr.*, 4 M.	3	20·0	700	300
,,	**Benjamin Constant** . shd.	2707	236	46	18	2800	La Seyne .	1892	1894	..	2	..	4 *6-in.*, 8 *4·7-in.*, 8 M., 4 l.	4	14·0	260	287
to.g.b.	**Gustavo Sampaio** . .	500	197	21	7¾	2500	Elswick .	1893	1894	..	..	..	2 *20-pr.*, 4 *7-pr.* . .	3	18·0	150	95
cr.	**Republica**	1300	210	35	13	750	Elswick. .	1892	1894	..	2–1	..	6 *4·7-in.*, 4 *6-pr.*, 6 M. .	4	17·0	170	160
,,	**Rio Grande do Sul** . .	3100	380	39	13½	17,500 tur.	Elswick .	1909	1910	328,500	..	..	10 *4·7-in.*, 8 *1·8*-in.	2	26·5	650	260
to.cr.	**Tamoyo**	1063	269	28¾	9¾	6500	Kiel . .	1898	1900	..	..	4½ shields	2 *3·9-in.*, 6 *2·2-in.*, 2 *1·4-in.*, 2 M.	3	23·0	293	110
,,	**Timbira**	1014	249½	30¾	10½	7000	Kiel . .	1896	1897	..	½	4½ shields	2 *3·9-in.*, 6 *2·2-in.*, 2 *1·4-in.*, 2 M.	3	22·5	250	110
g.v.	**Tiradentes** . . . shd.	800	165	30	11	1200	Elswick .	1892	1893	..	..	..	4 *4·7-in.*, 3 *6-pr.*, 4 M. .	2	14·5	110	107
to.cr.	**Tupy**	1014	249½	30¾	10½	7000	Kiel . .	1896	1897	..	½	4½ shields	2 *3·9-in.*, 6 *2·2-in.*, 2 *1·4-in.*, 2 M.	3	22·5	250	110

Eleven screw gunboats, 200 tons to 400 tons, and four 12-knot river gunboats built at Poplar. Two river gunboats built by Messrs. Yarrow were sent out in sections, 1907.

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CHILI.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position.		Guns.	Torpedo Tubes.			
															Heavy Guns.	Secondary.					
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			kts.	tons.	
a.c.	Almirante O'Higgins shd.	8500	411¾	62½	22	16,000 B.	Elswick .	1897	1898	..	7–5	2	..	..	7½–6	6	4 *8-in.*, 10 *6-in.*, 4 *4·7-in.*, 10 *12-pr.*, 10 *6-pr.*, 4 M.	3 (2 sub.)	21·5 *t*	1260	..
b.	Capitão Prat . . shd.	5981	328	60¾	21¾	12,000	La Seyne	1890	1893	391,000	12	3	4	..	10½	2	6 *9·4-in.* (Canet), 8 *4·7-in.* (Canet), 6 *2·2-in.*, 4 *1·8-in.*, 10 *1·4-in.*, 5 M.	4	18·3 *t*	775	485
a.c.	Esmeralda . . .	7020	436	53¼	22½	16,000	Elswick .	1896	1897	..	6 H.S.	2	..	6 H.S.	4½ Shields	..	2 *8-in.*, 16 *6-in.*, 8 *12-pr.*, 2 *3-pr.*, 4 M.	3 (2 sub.)	22·8 *t*	1350	500

A battleship of 22,000 tons is proposed.

Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.						in.	in.			knots.	tons.	
to.g.b.	Almirante Condell .	750	240	27½	10½	4500 B.	Birkenhead .	1890	1892	..	..	..	3 *14-pr.*, 4 *3-pr.*, 2 M. .	5	21·0	210	..
,,	Almirante Lynch .																
,,	Almirante Simpson. .	812	240	27½	10½	4700 N.	Birkenhead .	1896	1896	..	..	4½	2 *4·7-in.*, 4 *3-pr.* . .	3	21·0*t*	200	..
cr.	Blanco Encalada . shd.	4400	370	46½	18½	14,500	Elswick . .	1893	1894	..	4–1¾	..	2 *8-in.*, 10 *6-in.*, 12 *3-pr.*, 10 *1-pr.**	5	22·78 *t*	900	427
,,	Chacabuco . . shd	4500	360	46	18†	15,750	Elswick . .	1901	1903	..	4½–1¾	..	2 *8-in.*, 10 *4·7-in.*, 16 *1·8-in.*, 2 M., 1 l.	5	23·0	1000	..
,,	General Baquedano (Training)	2330	240	45¾	18†	1500 B.	Elswick . .	1898	1900	..	..	..	4 *4·7-in.*, 2 *12-pr.*, 2 *6-pr.*, 2 M., 1 l.	1	13·7 *t.*	300	302
,,	Ministro Zenteno . shd.	3600	330½	43¾	16¾	6500	Elswick . .	1896	1898	..	..	..	8 *6-in.*, 10 *6-pr.*, 4 *1-pr.** .	3	20·0*t*	800	..
,,	Presidente Errázuriz shd.	2047	268	35¾	19½	5400	La Seyne .	1890	1892	..	3½	..	4 *6-in.* (Canet), 2 *5-in.*, 4 *2·2-in.*, 6 M.	3	19·0	200	171

* Armstrong.

† Mean draught.

Two Gunboats of 145 tons displacement and one of 180 tons.

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CHINA.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.						in.	in.			kts.	tons.	
cr.	**Foo-Ching**	2500	253	36½	18	2400	..	1893	1895	..	4–2	4½	3 *5-in.* (K.), 4 M., 2 l.	..	16·0	..	..
to.g.b.	**Fei-Ying**	837	257¼	28½	12½	4500 Y.	Stettin	1895	1895	..	..	2	2 *4-in.*, 6 *3·4-in.*, 4 smaller	3	21·8 *t*	75	90
cr.	**Hai-Chi**	4300	396	46¾	18½	17,000	Elswick	1898	1899	..	5	6	2 *8-in.*, 10 *4·7-in.*, 12 *3-pr.*, 4 *1·4-in.*, 6 M.	5	24·0	300	374
„	**Hai-Shen**	2903	314¾	41	16	8000	Vulcan	1898	1898	..	3	2	3 *6-in.* (K.), 8 *4-in.*, 6 *1·4-in.* Hotchkiss, 6 M.	3 (1 sub.)	20·7 *t*	220 500	244
„	**Hai-Shew**						Stettin	1897	1898								
„	**Hai-Yung**							1897	1898								
„	**Hi-Ying**	2165	253	36¼	18	2400	..	1895	1897	..	..	..	2 *8-in.* (A.), 8 *4·7-in.*, 4 M.	1	21·0	..	..
to.cr.	**Kien-Wei**	861	256	26½	10½	7000 N.S.	Foochow	1900	1902	..	..	..	1 *3·9-in.*, 3 *2·5-in.*, 6 *1·4-in.*	2	22·5	360	300
„	**Kien-Gnan**						Foochow	1899	1902	..	..	..					
to.g.b.	**Kwang-Ting**	1000	235	27½	11¼	3400	..	1890	1892	..	..	..	3 *4·7-in.*, 4 M., 2 l.	4	16·0	..	120
g.b.	**Tchu-Tai**	552	..	..	..	..	Kobe	1906	..	..	..	..	2 *4·7-in.*, 2 *12-pr.*	..	13·0	..	..

Ten river gunboats (570 tons) and one smaller have been built in Japan.

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DENMARK.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
c.d.s.,t.	**Herluf Trolle** .	3415	271	50	16½	4200 T.	Copenhagen	1899	1901	..	8–4 H.S	2	7 H.S.	..	6 H.S.	6 H.S.	2 *9·4-in.*, 4 *5·9-in.*, 10 *2·2-in.*, 8 smaller.	3 (sub.)	16·0	250	250
b.	**Iver Hvitfeldt** .	3208	242	49½	18	5100	Copenhagen	1886	1889 1900	200,000	12	2	..	9½	8	..	2 *10·2-in.* (K.), 10 *6-pr.*, 8 M.	4 (1 sub.)	15·6	250	298
c.d.s.,t.	**Olfert Fischer** .	3415	271	50	16½	4200	Copenhagen	1903	1905	..	8–4 K.S.	2	7 K.S.	..	6 K.S.	6	2 *9·4-in.*, 4 *5·9-in.*, 10 *2·2-in.*, 8 smaller.	3 (sub.)	16·0	250	250
c.d.s.,t.	**Peder Skram** .	3543	274½	51½	16½	4600	Copenhagen	1908	..	..	8–4 K.S.	2	..	..	7 K.S.	6 K.S.		4	16·5	250	250
c.d.s.,t.	**Skjold** . .	2115	226½	38	13½	2200 T.	Copenhagen	1896	1899	..	9	2	..	7	8	4½	1 *9·4-in.*, 3 *4·7-in.* (K.), 4 *1·8-in.*, 1 M.	4	13·0	280	210

DENMARK.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.				tons.	
3rd cl. *cr.*	**Geiser** . . .	1260	257½	27½	11¼	3000 T.	Copenhagen	1892	1893	..	1½	..	2 *4·7-in.*, 4 *3·4-in.*, 6 M.	4	17·1 *t*	125	155
„	**Heimdal** . .	1260	257½	27½	11¼	3000 T.	Copenhagen	1894	1896	..	1½	..	2 *4·7-in.*, 4 *3-pr.*, 6 M.	4	17·5	125	155
„	**Hekla** . . .	1260	233	32¾	11¼	3000 T.	Copenhagen	1890	1893	..	1½	..	2 *6-in.*, 4 *2·2-in.*, 6 M.	4	17·0	125	155
cr.	**Valkyrien** . .	2854	268	43½	18	5300	Copenhagen	1887 1896	1890	..	2½	..	2 *8·2-in.* (K.), 6 *5·9-in.*, 4 Q.F., 10 M.	5	17·0	450	300

Gunboats.—Six (*Falster, Lille Belt, Öresund, Store Belt, Grönsund, Guldborgsund*), of 150 to 240 tons, 200 to 400 I.H.P.

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FRANCE.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	**Aube (Amiral)**	9856	458	66½	24½	22,155 *t* B.	St. Nazaire	1902	1904	973,440	6–4 H.S.	2	5–2 H.S.	..	7½ H.S.	6½–5 H.S.	2 *7·6-in.*, 8 *6·4-in.*, 6 *3·9-in.*, 20 small Q.F. and M.	2 (sub.)	21·9 *t*	970 1590	615
t.	**Bouvet**	12,007	401¼	70½	27½	14,000 B.	Lorient	1896	1898	1,100,770	15¾–8 H.S.	3½	4 H.S.	..	14½ H.S.	4 H.S.	2 *12-in.*, 2 *10·8-in.*, 8 *5·5-in.*, 8 *3·9-in.*, 19 small Q.F. and M.	2 (sub.)	18·2 *t*	621	621
t.	**Bouvines**	6691	293¾	58½	23½	8400 A'D.	La Seyne	1892	1894	594,640	17¾	4	..	..	14½	..	2 *12-in.*, 8 *3·9-in.*, 4 *1·8-in.*, 10 *1·4-in.* M.	2	16·05 *t*	300	323
t.	**Brennus**	11,190	361	67	26½	14,000 B.	Lorient	1891	1895	991,767	15¾ comp.	4	4¾ comp.	..	17¾ comp.	4¾ comp.	3 *13·4-in.*, 10 *6·4-in.*, 23 small Q.F. and M.	4	17·1 *t*	800	696
a.c.	**Bruix**	4735	365¼	46	19¾	9049 B.	Rochefort	1894	1896	409,622	3¾–2¾	2	3¾	..	3¾	3¾	2 *7·6-in.*, 6 *5·5-in.*, 4 *2·5-in.*, 4 *1·8-in.*, 4 *1·4-in.*, M.	4	18·3 *t*	406	391
t.	**Carnot**	11,954	382½	70½	27½	16,300 *t* D'A.	Toulon	1894	1896	1,070,088	17¾–9 comp.	2¾	4	..	14½	4	2 *12-in.*, 2 *10·8-in.*, 8 *5·5-in.*, 4 *2·5-in.*, 16 *1·8-in.*, 10 *1·4-in.*, and M.	2 (sub.)	17·86 *t*	705	625
b.	**Charlemagne**	11,108	385½	66½	27½	14,500 B.	Brest	1895	1898	1,096,432	15¾ H.N.	3½	3 H.N.	..	15¾ H.N.	3 H.N.	4 *12-in.*, 10 *5·5-in.*, 8 *3·9-in.*, 16 *1·8-in.*, 10 *1·4-in.*, 8 M.	2 (sub.)	18·1 *t*	680 1100	631
t.	**Charles Martel**	11,693	392½	71	27½	14,996 *t* D'A.	Brest	1893	1897	1,092,830	17¾	3½	4	..	15¾	4	2 *12-in.*, 2 *10·8-in.*, 8 *5·5-in.*, 4 *2·5-in.*, 14 *1·8-in.*, 5 *1·4-in.*	2 (sub.)	18·1 *t*	677	632
a.c.	**Charner (Amiral)**	4702	348	46	19½	8300 B.	Rochefort	1893	1895	353,200	3¾–2¾	2	3¾	..	3¾	3¾	2 *7·6-in.*, 6 *6·5-in.* 14 small Q.F. and M.	4	18·2 *t*	413	375
a.c	**Condé**	9856	458	63¾	24½	22,175 Nic.	Lorient	1902	1904	863,799	6–4 H.S.	2	5–2 H.S.	..	7½ H.S.	6½–5 H.S.	2 *7·6-in.*, 8 *6·4-in.*, 6 *3·9-in.*, 16 *1·8-in.*, 6 *1·4-in.*	2 (sub.)	21·4 *t*	970 1590	615
b.	**Condorcet.**	17,710	476	84	27	22,500 tur.	St. Nazaire	1909	..	2,165,200	10–8 K.S.	2¾	8¾	..	12 K.S.	8¾ K.S.	4 *12-in.*, 12 *9·4-in.*, 16 *12 pr.*, 8 *3-pr.*, 2 *1-pr.*	2 (sub.)	19·0	960 2010	681
b.	**Danton**	17,710	476	84	27	22,500 tur.	Brest	1909	..	2,068,000	10–8 K.S.	2¾	8¾	..	12 K.S.	8¾ K.S.	4 *12-in.*, 12 *9·4-in.*, 16 *12-pr.*, 8 *3-pr.*, 2 *1-pr.*	2 (sub.)	19·0	960 2010	681
b.	**Démocratie**	14,635	438¾	79½	27½	19,190 B.	Brest	1904	1907	1,473,180	11–7 H.S.	2¾	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 10 *7·6-in.*, 26 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	19·44 *t*	905 1285	793

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FRANCE.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position.		Guns.	Torpedo Tubes.			
															Heavy Guns.	Secondary.					
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	**Desaix** . shd.	7578	426½	58¼	24½	17,715 *t* B.	St. Nazaire	1901	1903	762,759	4–3 H.S.	2¾	..	..	3½ H.S.	..	8 *6·4-in.*, 4 *3·9-in.*, 10 *1·8-in.*, 4 *1·4-in.*	2	21·7 *t*	889 1200	531
b.	**Diderot** . .	17,710	476	84	27	22,500 tur.	St. Nazaire	1909	..	2,167,000	10–8 K.S.	2¾	8¾	..	12 K.S.	8¾	4 *12-in.*, 12 *9·4-in.*, 16 *12-pr.*, 8 *3-pr.*, 2 *1-pr.*	2 (sub.)	19·0	960 2010	681
a.c.	**DupetitThouars**	9367	452¾	63¾	24½	22,000 *t* B.	Toulon .	1901	1905	831,839	6 H.S.	2	3¾	6 H.S.	6 H.S.	3¾ H.S.	2 *7·6-in.*, 8 *6·4-in.*, 4 *3·9-in.*, 16 *1·8-in.*, 6 *1·4-in.*	2 (sub.)	22·5 *t*	1020 1600	610
a.c.	**Dupleix** . shd.	7578	426½	58¼	24½	17,100 B.	Rochefort .	1900	1903	652,354	4–3 H.S.	2¾	..	..	3½ H.S.	..	8 *6·4-in.*, 4 *3·9-in.*, 10 *1·8-in.*, 4 *1·4-in.*	2	21·0	880 1200	531
a.c.	**Edgard Quinet**	13,780	515	70½	27½	36,000 B.	Brest .	1907	..	1,307,536	6½–3½ K.S.	2½–1¼	5–2 K.S	4¾ K.S.	8 K S.	4¾ K.S	14 *7·6-in.*, 16 *2·4-in.*, 8 *1·4-in.*, 2 smaller.	2 (sub.)	23·0	1242 2300	738
a.c.	**Ernest Renan** .	13,427	515	70½	26¾	37,500 Nic., *t*	St. Nazaire	1906	1909	1,410,000	6¾–4 H.S.	2	5–3 H.S.	4¾	6 H.S.	5 H.S.	4 *7·6-in.*, 16 *6·4-in.*, 16 *9-pr.*, 8 *3-pr.*	2 (sub.)	25·5 *t*	1354 2300	674
b.	**Gaulois** . .	11,105	385½	66½	27½	14,500 B.	Brest .	1896	1898	1,093,925	15¾ H.N.	3½–1½	3 H.N.	..	15¾ H.N.	3 H.N.	4 *12-in.*, 10 *5·5-in.*, 8 *3·9-in.*, 16 *1·8-in.*, 10 *1·4-in.*, 8 M.	2 (sub.)	18·0	680 1100	632
a.c.	**Gloire** . .	9856	453	63¾	24½	20,500 Nic.	Lorient .	1900	1904	883,269	6–4 H.S.	2	5–2 H.S.	..	7½ H.S.	6½–5 H.S.	2 *7·6-in.*, 8 *6·4-in.*, 6 *3·9-in.*, 16 *1·8-in.*, 6 *1·4-in.*	2 (sub.)	21·0	970 1580	615
a.c.	**Gueydon** . . (Amiral)	9367	459	63¾	24½	20,200 Nic.	Lorient .	1899	1902	817,994	6–3¾ H.S.	2	3¾ H.S.	6 H.S.	6 H.S.	3¾ H.S.	2 *7·6-in.*, 8 *6·4-in.*, 4 *3·9-in.*, 16 *1·8-in.*, 6 *1·4-in.*	2 (sub.)	21·0	1020 1600	610
t.	**Henri IV.** .	8807	354½	72	23	11,500 Nic.	Cherbourg.	1899	1903	801,248	11–7 H.S.	3	4¾ H.S.	..	11¾ H.S.	5 H.S.	2 *10·8-in.*, 7 *5·5-in.*, 12 *1·8-in.*, 2 M.	2 (sub.)	17·2 *t*	735 1100	464
t.	**Jauréguiberry** .	11,637	364	72¾	27¾	15,800 D'A.	La Seyne .	1893	1896	1,069,536	17¾	2¾	4	..	14½	4	2 *12-in.*, 2 *10·8-in.*, 8 *5·5-in.*, 4 *2·5-in.*, 12 *1·8-in.*, 8 *1·4-in.*, 8 M.	2 (sub.)	18·07 *t*	700	625
a.c.	**Jeanne d'Arc** .	11,092	477¼	63¾	26½	28,000 Guyot	Toulon .	1899	1903	875,847	6–3 H.S.	2·2	3 H.S.	..	6 H.S.	5 H.S.	2 *7·6-in.*, 14 *5·5-in.*, 16 *1·8-in.*, 8 *1·4-in.*, 2 M.	2 (sub.)	21·7 *t*	1400 2000	626

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a.c.	**Jules Ferry** .	12,351	480½	70½	27	28,753 Guyot	Cherbourg	1903	1906	1,169,940	6¾–4 H.S.	2	5–3 H.S.	6	6 H.S.	5 H.S.	4 *7·6-in.*, 16 *6·4-in.*, 22 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	22·8 *t*	1320 2100	728
a c.	**Jules Michelet.**	12,370	480½	70½	27	27,700 Guyot	Lorient .	1905	1908	1,204,107	6–4 K.S.	2	5–3 K.S.	6 H.S.	8 K.S.	5 K.S.	4 *7·6-in.*, 12 *6·4-in.*, 24 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	23·2 *t*	1320 2100	724
b.	**Justice** . .	14,635	438¾	79½	27½	18,548 Nic. *t.*	La Seyne .	1904	1907	1,670,385	11–7 H.S.	2¾	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 10 *7·6-in.*, 26 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	19·43 *t*	905 1825	793
a.c.	**Kléber** . shd.	7578	426½	58½	24½	18,000 Nic.	Bordeaux .	1902	1903	770,320	4–3 H.S.	2¾	..	..	3½ H.S.	..	8 *6·4-in.*, 4 *3·9-in.*, 10 *1·8-in.*, 4 *1·4-in.*	2	21·2 *t*	880 1200	531
a.c.	**Latouche-Tréville**	4661	348	46	19¼	8300 B.	Havre .	1892	1893	360,000	3¾–2¾	2	3¾	..	3¾	3¾	2 *7·6-in.*, 6 *5·5-in.*, 4 *2·5-in.*, 4 *1·8-in.*, 6 *1·4-in.*, M.	4	18·2 *t*	406	375
a.c.	**Léon Gambetta**	12,351	480½	70½	27	27,500 Nic.	Brest .	1901	1904	1,169,940	6¾–4 H.S.	2	5–3 H.S.	6	8 H.S.	5 H.S.	4 *7·6-in.*, 16 *6·4-in.*, 22 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	23·06 K.	1320 2100	728
b.	**Liberté** . .	14,635	434¾	79½	27½	20,565 B. *t.*	St. Nazaire	1905	1907	1,652,436	11 H.S.	..	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 10 *7·6-in.*, 26 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	19·31 *t*	905 1825	793
a.c.	**Marseillaise** .	9856	453	63¾	24½	20,500 B.	Brest .	1900	1903	881,270	6–4 H.S.	2	5–2 H.S.	..	7½ H.S.	6½–5 H.S.	2 *7·6-in.*, 8 *6·4-in.*, 6 *3·9-in.*, 2 *2·5-in.*, 18 *1·8-in.*, 6 *1·4-in.*	2 (sub.)	21·0	970 1590	615
t.	**Masséna** . .	11,735	384¾	66	27	13,500 D'A.	St. Nazaire	1895	1898	1,100,400	17¾–9¾	3½	4 H.S.	16	15¼15¾ H. S.	4	2 *12-in.*, 2 *10·8-in.*, 8 *5·5-in.*, 8 *3·9-in.*, 12 *1·8-in.*, 12 *1·4-in.*	2 (sub.)	17·1 *t*	630	642
b.	**Mirabeau** .	17,710	476	84	27	22,500 tur.	Lorient .	1909	..	2,032,000	10–8 K.S.	2¾	8¾	..	12 K.S.	8¾ K.S.	4 *12-in.*, 12 *9·4-in.*, 16 *12-pr.*, 8 *3-pr.*, 2 *1-pr.*	2 (sub.)	19·0	960 2010	681
a.c.	**Montcalm** . .	9367	452¾	63¾	24½	19,600 N.S.	La Seyne .	1900	1902	902,809	6 H.S.	2	3¾ H.S.	6 H.S.	6 H.S.	2¾ H.S.	2 *7·6-in.*, 8 *6·4-in.*, 4 *3·9-in.*, 16 *1·8-in.*, 6 *1·4-in.*	2 (sub.)	21·0	1020 1600	612
b.	**Patrie** . .	14,635	438¾	79½	27½	17,859 *t* Nic.	La Seyne .	1903	1906	1,674,870	11–7 H.S.	2¾	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 18 *6·4-in.*, 26 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	19·12 *t*	905 1825	793
a.c.	**Pothuau** . .	5374	370½	50¼	21	10,398 B.	Havre .	1895	1896	384,000	3½–2	3⅜	2½	..	9½	5½	2 *7·6-in.*, 10 *5·5-in.*, 16 *1·8-in.*, 8 *1·4-in.*	4	19·2 *t*	538	461
b.	**République** .	14,635	438¾	79½	27½	19,626 *t* Nic.	Brest .	1902	1906	1,523,136	11–7 H.S.	2¾	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 18 *6·4-in.*, 26 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	19·15	905 1825	793

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FRANCE.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft	ft.					£	in.	in.	in.	in.	in.	in.			kts.	tons.	
b.	**Saint Louis** .	11,090	385½	66½	27½	14,500 B.	Lorient .	1896	1900	1,080,997	15¾ H.N.	3½	3 H.N.	..	3–15¾ H.N.	3 H.N.	4 *12-in.*, 10 *5·5-in.*, 8 *3·9-in.*, 16 *1·8-in.*, 10 *1·4-in.*, 8 M.	2 (sub.)	18·0	820 / 1150	631
t.	**Suffren** .	12,527	411¾	70¼	27½	16,500 Nic.	Brest .	1899	1903	1,195,564	12–8 H S.	2¾	5–3 H.S.	..	12 H.S.	6–5 H.S.	4 *12-in.*, 10 *6·4-in.*, 8 *3·9-in.*, 20 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	18·0	1100 / 1820	615
t.	**Tréhouart** .	€671	293¼	58½	23¼	8500 B.	Lorient .	1893	1896	593,100	17¾	4	..	..	14½	..	2 *12-in.*, 8 *3·9-in.*, 4 *1·8-in.*, 4 *1·4-in.*, 8 M.	2	15·76 *t*	300	337
b.	**Vergniaud** .	17,710	476	84	27	22,500 tur.	Bordeaux .	Bldg.	..	2,165,200	10–8 K.S	2¾	8¾	..	12 K.S.	8¾ K S.	4 *12-in.*, 12 *9·4-in.*, 16 *12-pr.*, 8 *3-pr.*, 2 *1-pr.*	2 (sub)	19·0	960 / 2010	681
b.	**Vérité** .	14,635	438¾	79½	27½	20,433 *t* B.	Bordeaux .	1907	1908	1,661,409	11–7 H.S.	2¾	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 10 *7·6-in.*, 26 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	19·26 *t*	905 / 1825	822
a.c.	**Victor Hugo** .	12,351	480½	70¼	27	28,486 *t* B.	Lorient .	1904	1907	1,229,932	6¾–4 H S.	2	5–3 H.S.	6	8 H.S.	5 H.S.	4 *7·6-in.*, 16 *6·4-in.*, 22 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	22·5 *t*	1320 / 2100	728
b.	**Voltaire** .	17,710	476	84	27	22,500 tur.	La Seyne .	1909	..	2,169,200	10–8 K.S.	2¾	8¾	..	12 K.S.	8¾ K.S.	4 *12-in.*, 12 *9·4-in.*, 16 *12-pr.*, 8 *3-pr.*, 2 *1-pr.*	2 (sub.)	19·0	960 / 2010	681
a.c.	**Waldeck-Rousseau** .	13,780	515	70¼	27½	36,000 Nic.	Lorient .	1908	..	1,301,380	6½–3½	2½	5	4¾	6	5½	14 *7·6-in.*, 16 *2·4-in.*, 8 *3-pr.*, 2 *1-pr.*	2 (sub.)	23·0	1242 / 2300	738
b.	To replace **Brennus**	23,082	541½	88½	29½	28,000 tur.	Brest / Lorient	Pro.	..	2,680,000	10½–7 K.S.	2¾–1¾	7 K.S.	..	..	7 K.S.	12 *12-in.*, 22 *5·5-in.*, 8 *3-pr.*	4 (sub.)	20·0	930 / 2700	..
b.	**Additional** .																				

Requin now used for the gunnery school. The Caïman, Dupuy de Lôme, Hoche, Indomptable, Jemmapes, and Valmy have been removed from the table of French armoured ships, having been placed on the list for condemnation by the Minister.

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FRANCE.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
3rd cl. *cr.*	**Alger**	4313	346	45¼	19½	8254 B.	Cherbourg	1889	1893	280,000	3½	..	4 *6·4-in.*, 6 *5·5-in.*, 10 smaller, 10 M.	5	19·61 *t*	860	325
to. g. b.	**Casabianca**	974	262½	26¾	11½	5200 D'A.	Bordeaux	1895	1896	98,985	½	..	1 *3·9-in.*, 3 *2·5-in.*, 5 *1·8-in.*, 4 *1·4-in.*	2	22·0	116	143
3rd cl. *cr.*	**Cassard**	3890	325½	45	20½	10,143 D'A.	Cherbourg	1896	1898	318,712	3	2 shield	6 *6·4-in.*, 4 *3·9-in.*, 10 *1·8-in.*, 3 *1·4-in.*, 2 M.	2	19·8 *t*	630	385
to. g. b.	**Cassini**	966	262½	27¼	11½	5500 D'A.	Bordeaux	1894	1894	98,500	½	..	1 *3·9-in.*, 3 *2·5-in.*, 4 *1·4-in.*	2	21·2 *t*	110	118
3rd cl. *cr.*	**Chasseloup-Laubat**	3824	308½	43½	20¾	9000 D'A.	Cherbourg	1893	1894	256,320	3	..	6 *6·4-in.*, 4 *3·9-in.*, 8 *1·8-in.*, 12 *1·4-in.*, M.	2	19·25 *t*	587	358
2nd cl. *cr.*	**Châteaurenault** shd.	7898	442¾	55¾	24½	24,300 *t* N.S.	La Seyne	1898	1902	606,656	2½	2 shield	2 *6 4-in.*, 6 *5·5-in.*, 10 *1·8-in.*	2	24·19 *t*	1400 / 2100	625
3rd cl. *cr.*	**Cosmao**	1923	312	30½	14	6000	Bordeaux	1888	1890	133,000	1½	..	4 *5·5-in.*, 8 other Q.F., 4 M.	4	20·5 *t*	200	190
g. v.	**Décidée**	635	184¾	26¼	12¼	1000 Nic.	Lorient	1899	1900	54,100	..	..	2 *3·9-in.*, 4 *2·5-in.*, 4 *1·4-in.*	..	13·0	99	99
2nd cl. *cr.*	**D'Entrecasteaux** shd.	7995	383½	58½	25¾	13,500	La Seyne	1896	1898	667,740	4	10–3 H.S.	2 *9·4-in.*, 12 *5·5-in.*, 12 *1·8-in.*	2	19·2 *t*	650	521
3rd cl. *cr.*	**Descartes** shd.	3970	326	42¼	21¾	9000 B.	St. Nazaire	1894	1896	334,725	1½	..	4 *6·4-in.*, 10 *3·7-in.*, 8 *1·8-in.*, 4 *1·4-in.*	2	21·0 *t*	552	386
3rd cl. *cr.*	**D'Estrées** shd.	2421	311¾	39¼	17¾	8500 Nor.	Rochefort	1897	1900	208,200	1½	..	2 *5·5-in.*, 4 *3·9-in.*, 8 *1·8-in.*, 2 *1·4-in.*	..	20·5 *t*	345 / 480	234

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FRANCE.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
to. g. b.	D'Iberville	952	262½	27	11¼	5060 D'A.	St. Nazaire	1893	1894	99,120	½	..	1 *3·9-in.*, 1 *2·5-in.*, 4 *1·4-in.*	6	21·4 *t*	117	118
3rd cl. *cr.*	Du Chayla . shd.	3890	325½	45	20½	10,009 D'A.	Cherbourg	1895	1897	315,835	3	2 shield	6 *6·4-in.*, 4 *3·9-in.*, 10 *1·8-in.*, 3 *1·4-in.*, 2 M.	2	20·2 *t*	624	385
to. g. b.	Dunois	889	256	27¾	12¾	7000 N.S.	Cherbourg	1897	1898	123,383	..	..	6 *2·5-in.*, 6 *1·8-in.*	..	23·0	137	128
to. cr.	Epervier	1268	216½	29¼	15½	3200	Rochefort	1885	1887	80,000	1½	..	5 *3·9-in.*, 1 *2·5-in.*, 6 M.	4	17·6 *t*	160	134
to. cr.	Faucon	1311	216½	29¼	15½	3200	Toulon	1887	1888	80,000	1½	..	5 *3·9-in.*, 1 *2·5-in.*, 6 M.	4	18·0	150	134
3rd cl. *cr.*	Forbin	1935	312	30½	16	5700	Rochefort	1888	1890	123,739	1½	..	4 *5·5-in.*, 8 other Q.F., 4 M.	4	20·6	200	190
T.D.S.	Foudre	5984	370½	52½	23½	11,900 *t* D'A.	Bordeaux	1895	1897	407,712	3½	..	8 *3·9-in.*, 4 *2·5-in.*, 4 *1·4-in.*	4	19·9 *t*	840	410
3rd cl. *cr.*	Friant	3882	308½	43½	20¾	9000 Nic.	Brest	1893	1894	308,750	3	..	6 *6·4-in.*, 4 *3·9-in.*, 8 *1·8-in.*, 6 *1·4-in.*	2	18·19	587	358
3rd cl. *cr.*	Galilée	2318	330¼	34½	17¾	6600 B.	Rochefort	1896	1897	208,152	1½	2 shield	4 *5·5-in.*, 2 *3·9-in.*, 8 *1·8-in.*, 8 *1·4-in.*	2	20·0	226	248
2nd cl. *cr.*	Guichen . shd.	8151	436¼	54¾	24½	24,000 D'A.	St. Nazaire	1897	1902	611,945	2½	2 shield	2 *6·4-in.*, 6 *5·5-in.*, 10 *1·8-in.*	2	23·0	1460	625
3rd cl. *cr.*	Isly	4406	346	48¾	19½	8100	Brest	1891	1892	252,760	3	..	4 *6·4-in.*, 6 *5·5-in.*, 14 *2·5-in.* and *1·8-in.*, 8 M.	3	18·3	880	332
2nd cl. *cr.*	Jurien de la Gravière shd.	5595	440	43½	22	17,000 Guyot	Lorient	1899	1901	475,979	3	..	8 *6·4-in.*, 12 *1·8-in.*	2	22·9 *t*	600/900	511

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g. v.	Kersaint	shd.	1223	226	34½	15	2200	Rochefort	1897	1898	107,933	..	..	1 *5·5-in.*, 5 *3·9-in.*, 7 *1·4-in.*	..	15·0	199	110
to. g. b.	La Hire		889	256	27¾	12¾	7000 N.S.	Cherbourg	1898	1899	123,383	..	..	6 *2·5-in.*, 6 *1·8-in.*	..	23·0	137	128
3rd cl. *cr.*	Lalande		1968	311½	31¼	14	6000	Bordeaux	1888	1900	133,800	1½	..	4 *5·5-in.*, 8 other Q.F., 4 M.	4	22·0	200	190
3rd cl. *cr.*	Lavoisier		2285	330¼	34½	17¾	6400 B.	Rochefort	1897	1899	202,024	1½	2 shield	4 *5·5-in.*, 2 *3·9-in.*, 8 *1·8-in.*, 2 *1·4-in.*, 4 M.	2	20·0	226	248
3rd cl. *cr.*	Surcouf		2012	312	30½	14	6000	Cherbourg	1888	1900	131,200	1½	..	4 *5·5-in.*, 8 other Q.F., 4 M.	4	20·5 *t*	200	190
g. v.	Surprise		617	184¾	24½	12¼	853 *t*	Havre	1895	1896	50,954	..	..	2 *3·9-in.*, 4 *2·5-in.*, 4 *1·4-in.*	..	13·4 *t*	73	99
g. v.	Zélée		554	185½	26	10½	1000 Nic.	Rochefort	1899	1900	..	..	..	2 *3·9-in.*, 4 *2·5-in.*, 4 *1·4-in.*	..	13·0	80	75

Gun vessel Fulton (899 tons); gunboats Comète, Lion. Shallow-draught gunboats Argus and Vigilante, launched at Chiswick 1900:—displacement, 122 tons; 13 knots.

From the French cruising ship tables the following vessels, placed on the list for condemnation, have been removed: Catinat, D'Assas, Davout, Infernet, Linois, Pascal, and Protet. The condemnation of the Chasseloup-Laubat, Galilée, and Lalande is also under consideration.

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Merchant Cruisers (Auxiliary to French Navy).

To what Company belonging.	Name.	Register Tonnage.	Length.	Beam.	Depth.	Speed.	When built.
		Tons.	Feet.	Feet.	Feet.	Knots.	
Compagnie Générale Transatlantique	La Provence	15,000	—	—	—	22	1905
	La Lorraine	11,869	563·1	60·0	35·9	20	1900
	La Savoie	11,200	563·1	60·0	35·9	20	1900
	L'Aquitaine	8810	500·0	57·3	34·0	19	1890
	La Touraine	9047	520·2	56·0	34·6	19	1890
	Duc de Bragance	2096	334·6	34·2	16·8	17½	1889
	Eugène Pereire	2078	334·6	35·1	23·9	17½	1888
	La Bretagne	7112	495·4	51·8	34·5	17½	1886
	La Champagne	7087	493·4	51·8	34·5	17½	1885
	La Gascogne	7395	495·4	52·2	34·8	17½	1886
	Maréchal Bugeaud	2206	342·5	34·1	23·0	17½	1890
	Ville d'Alger	2211	342·7	36·1	23·0	17½	1890
Messageries Maritimes	Armand Béhic	6635	486·6	50·1	36·8	17½	1892
	Australien	6570	482·3	49·2	34·1	17½	1889
	Polynésien	6569	482·3	49·2	34·1	17½	1890
	Ville de la Ciotat	6631	485·8	49·9	36·8	17½	1892
	Annam	6344	446·2	50·9	36·1	17½	1898
	Atlantique	6708	468·9	50·6	32·8	17½	1899
	Tonkin	6364	446·2	50·9	36·1	17½	1898

NOTE.—The armament for the larger ships is 7 5·5-in. and smaller quick-firers.

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GERMANY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
c. d. s.	**Aegir**	4084	267	49½	17¾	4800 fT.	Kiel (Danzig)	1895 1903	1897	233,500	9½ B.S.	2	..	..	8¾ H.S.	..	3 *9·4-in.*, 10 *3·4-in.*, 6 M.	4 (1 sub.)	14·8 *t*	225 †	276
c. d. s.	**Beowulf**	4049	267	49½	17¾	4800 T.S.	Bremen	1890 1902	1893	175,000	9½	1½	..	..	8	..	3 *9·4-in.*, 10 *3·4-in.*, 7 M.	4	15·0	580 †	297
a. c.	**Blücher**	15,253	499	80½	..	40,000 *t*	Kiel	1908	1910	1,835,000	6 K.S.	..	..	..	..	..	12 *8·2-in.*, 8 *5·9-in.*, 16 *3·4-in.*	4	25·3 *t*	900 2360	847
b.	**Brandenburg**	9874	354½	65	24½	9640	Stettin (Vulcan)	1891	1893	606,500§	15¾ *comp.*	2½	..	..	11¾ *comp.*	1½	6 *11-in.*, 8 *4·1-in.*, 8 *3·4-in.*, 12 *1·4-in.*, 8 M., 21.	3	16·5 *t*	680 800	552
b.	**Braunschweig**	12,997	398½	73½	24½	16,000 T.S. & C.	Germania	1902	1904	1,157,500	9–4 K.S.	3	6 K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 *11-in.*, 14 *6·7-in.*, 12 *3·4-in.*, 12 *1·4-in.*, 8 M.	6 (sub.)	18·0	700 1600‡	660
b.	**Deutschland**	13,040	398½	72¾	24½	16,939 T.S. & C.	Germania	1904	1906	1,214,000	9½–4 K.S.	3	8 K.S.	6 K.S.	10–6 K.S.	6¾ K.S.	4 *11-in.*, 14 *6·7-in.*, 22 *3·4-in.*, 4 *1·4-in.*, 4 M.	6 (sub.)	18·5 *t*	700 1800†	736
b.	**Elsass**	12,997	398½	72¾	24½	16,812 W.T.& C.	Danzig (Schichau)	1903	1905	1,157,500	9–4 K.S.	3	6 K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 *11-in.*, 14 *6·7-in.*, 12 *3·4-in.*, 12 *1·4-in.*, 8 M	6 (5 sub.)	18·7	800 1600†	660
a c.	**Friedrich Karl**	8858	393½	65½	24	18,500 Dürr.	Hamburg (Blohm&Voss)	1902	1904	875,000	4 K.S.	2	6 K.S.	4 K.S.	6 K.S.	4 K.S.	4 *8·2-in.*, 10 *5·9-in.*, 12 *3·4-in.*, 14 *1·4-in.*, 4 M.	4 (3sub.)	20·5 *t*	950 1500†	504
b.	**Frithjof (Ersatz)***	22,000	..	..	..	28,000	Danzig (Schichau)	Bldg.	..	..	..	..	..	..	..	..	12 *12-in.*	..	..	..	..
a. c.	**Fürst Bismarck**	10,570	393½	66½	26	14,000 Dürr.	Kiel	1897	1900	..	7¾ K.S.	3	..	..	7¾ K.S.	..	4 *9·4-in.*, 12 *5·9-in.*, 10 *3·4-in.*, 10 *1·4-in.*, 8 M.	6 (5 sub.)	19·0	1000†	565
a. c.	**Gneisenau**	11,420	449½	70¾	24½	26,000 T.S.	Bremen (Weser)	1906	1908	..	6–3 K.S.	2	6–4¾	..	6¾	..	8 *8·2-in.*, 6 *5·9-in.*, 20 *3·4-in.*, 14 *smaller.*	4	23·8 *t*	800† 2000	650
a. c.	**H***	21,500	..	..	..	70,000 tur.	Hamburg (Blohm&Voss)	Bldg.	..	..	..	..	..	..	..	..	12 *12-in.*	..	27·0	..	..
c. d. s.	**Hagen**	4049	267	49½	17¾	5250 T.	Kiel	1893 1900	1895	..	7 K.S.	1¼	..	..	7¾ H.S.	..	3 *9·4-in.*, 10 *3·4-in.*, 7 M.	4	15·0	580†	297
b.	**Hannover**	13,040	398½	73¾	25¼	22,492 T.S. t	Wilhelmshaven	1905	1907	1,157,500	9½–4 K.S.	3	8 K.S.	6 K.S.	10–6 K.S.	6¾ K.S.	4 *11-in.*, 14 *6·7-in.*, 20 *3·4-in.*, 4 *1·4-in.*, 4 M.	6 (5sub.)	19·16 *t*	700 1800†	736
c. d. s.	**Heimdall**	4049	267	49½	17¾	4393 T.S.	Wilhelmshaven	1892 1902	1893	233,500	7 K.S.	1¼	..	..	7¾ H.S.	..	3 *9·4-in.*, 10 *3·4-in.*, 7 M.	4	15·0	580†	297
b.	**Heimdall (Ersatz)***	22,000	..	..	..	28,000 (tur.)	Hamburg (Vulcan)	Bldg.	..	..	..	..	..	..	..	..	12 *12-in.*	..	..	..	..

* Particulars doubtful. † Also liquid fuel. ‡ And 200 tons "tar oil." § Exclusive of armament.

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GERMANY.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			kts.	tons.	
b.	Helgoland*	22,000	490	90	27½	22,000	Kiel (Howaldt)	1909	..	..	12–4	..	..	..	..	..	12 *12-in.*, 14 *5·9-in.*, 20 *4·1-in.*	6	20·0	950	950
b.	Hessen	12,997	398½	73¾	24½	16,000 T.S. & C.	Kiel (Germania)	1903	1905	1,157,500	9–4 K.S.	3	6 K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 *11-in.*, 14 *6·7-in.*, 12 *3·4-in.*, 12 *1·4-in.*, 8 M.	6 (5 sub.)	18·0	800 1600◊	660
b.	Hildebrand (Ersatz)*	22,000	..	..	..	28,000 (tur.)	Kiel	..	..	..	..	..	..	..	..	..	12 *12-in.*	..	..	..	..
b.	Kaiser Barbarossa	10,974	377¼	66¾	25½	13,000 C. & T.	Danzig	1900	1901	962,500	11¾ H. N. S.	3	..	..	9¾ H. N. S.	6 H.N.S.	4 *9·4-in.*, 14 *5·9-in.*, 12 *3·4-in.*, 12 *1·4-in.*, 8 M.	4 (sub.)	16·0	650 1050◊	700
b.	Kaiser Friedrich III.					13,000 C. & T.	Wilhelmshaven	1896	1898												
b.	Kaiser Wilhelm II.					13,000 C. & T.S.	Wilhelmshaven	1897	1900		11¾ H. N. S.	3	..	..	9¾ H. N. S.	6 H.N.S.	4 *9·4-in.*, 18 *5·9-in.*, 12 *3·4-in.*, 12 *1·4-in.*, 8 M.	6 (5 sub.)	18·0	650 1050◊	700
b.	Kaiser Wilhelm der Grosse					13,000 C. & T.S.	Germania	1899	1901												
b.	Kaiser Karl der Grosse					13,000 C. & T.S.	Hamburg (Blohm & Voss)	1899	1901												
b.	Kurfürst Friedrich Wilhelm.	9874	354¼	65	24½	9959	Wilhelmshaven	1891	1893	653,000‡	15¾ *comp.*	2½	..	..	11¾ *comp.*	1½	6 *11-in.*, 8 *4·1-in.*, 8 *3·4-in.*, 12 *1·4-in.*, 8 M., 2 l.	3 (sut.)	16·0	680 800	550
b.	Lothringen	12,997	398½	73¾	24½	16,950 W.T.&C.	Schichau (Danzig)	1904	1906	1,157,500	9–4 K. S.	3	6 K. S.	6 K.S.	10–6 K. S.	6 K. S.	4 *11-in.*, 14 *6·7-in.*, 12 *3·4-in.*, 12 *1·4-in.*, 8 M.	6 (5 sub.)	18·54 *t*	800 1600◊	600
b.	Mecklenburg	11,643	393¾	68¼	24¾	14,000 C.T. & S.	Stettin (Vulcan)	1901	1903	1,061,250	9–4 K.S.	3	5½ K.S.	6 K.S.	10 K.S.	6 K.S.	4 *9·4-in.*, 18 *5·9-in.*, 12 *3·4-in.*, 12 *1·4-in.*, 8 M.	6 (5sub.)	18·1 *t*	700 1450◊	715
a. c.	Moltke*	19,000	..	..	..	45,000 (tur.)	Hamburg (Blohm & Voss)	1910	..	..	..	..	..	..	..	..	12 *11-in.*	..	25	..	..
b.	Nassau	18,200	455	88½	26½	25,000	Wilhelmshaven	1908	1910	1,825,000	12–4 K.S.	..	..	..	11 K.S.	..	12 *11-in.*, 12 *5·9-in.*, 16 *3·4-in.*	6	20·7 *t*	950 2700	961
c. d. s.	Odin	4084	267	49¼	17¾	4800 T.S.	Danzig	1894	1896	..	9½ H. S.	2	..	..	8¾ H. S.	..	3 *9·4-in.*, 10 *3·4-in.*, 6 M.	4 (1sub.)	15·0	225§	266

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b.	Oldenburg	5140	246	59	19½	3900	Stettin	1884	1887	235,342	12 *comp.*	1	..	..	8 *comp.*	..	8 *9·4-in.*, 2 *3·4-in.*, 6 M.	4	13·5 *t*	475	356
b.	Ostfriesland*	22,000	490	90	27½	22,000	Wilhelms-haven	1909	..	..	12–4	..	..	..	..	..	12 *12-in.*, 14 *5·9-in.*, *4·1-in.*	20	6	20·0	950	950
b.	Pommern	13,040	398½	72¾	25¼	20,400 T.S. t.	Stettin (Vulcan)	1905	1907	1,214,000	9½–4 K.S.	3	8 K.S.	6 K.S.	10–6 K.S.	6¾ K.S.	4 *11-in.*, 14 *6·7-in.*, *3·4-in.*, 4 *1·4-in.*, 4 M.	20 (5sub.)	6	19·21 *t*	700 1800◊	736
b.	Posen	18,200	455	88½	26½	25,000	Kiel (Germania)	1908	1910	1,825,000	12–4 K.S.	..	..	..	11 K.S.	..	12 *11-in.*, 12 *5·9 in.*, *3·4-in.*	16	6	20·5	950 2700	961
b.	Preussen	12,997	389½	73¾	24½	18,374 W.T.& C.	Stettin	1903	1905	1,157,500	9–4 K.S.	3	6 K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 *11-in.*, 14 *16·7-in.*, *3·4-in.*, 12 *1·4-in.* & 8 M.	12 (5sub.)	6	18·6 *t*	800 1600◊	660
a. c.	Prinz Adalbert	8858	393½	65½	24	18,500 Dürr.	Kiel	1901	1903	885,000	4 K.S.	1½	3 K.S.	3 K.S.	6 K.S.	4 K.S.	4 *8 2-in.*, 10 *5·9-in.*, *3·4-in.*, 14 *1·4-in.*, 4 M.	12 (3sub.)	4	20·3	950 1500◊	504
a. c.	Prinz Heinrich	8759	396	64¼	25¼	15,000 Dürr.	Kiel	1900	1902	730,000	4 K.S.	2½	4 K.S.	..	6 K.S.	4 K.S.	2 *9·4-in.*, 10 *5·9-in.*, *3·4-in.*, 10 *1·4-in.*, 4 M.	10 (3sub.)	4	20·0	950	528
b.	Rheinland	18,200	455	88½	26½	25,000	Stettin (Vulcan)	1908	1910	1,825,000	12–4 K.S.	..	..	..	11 K.S.	..	12 *11-in.*, 12 *5·9-in.*, *3·4-in.*	16	6	20·0	950 2700	961
a. c.	Roon	9350	403¼	65½	24	20,625 Dürr.	Kiel	1903	1905	875,000	4–3 K.S.	2¾	6 K.S.	4 K.S.	6 K.S.	4 K.S.	4 *8·2-in.*, 10 *5·9-in.*, *3·4-in.*, 10 *1·4-in.*, 4 M.	16 (sub.)	4	21·17	750 1800◊	50
a. c.	Scharnhorst	11,420	449½	70¾	24½	26,000 T.S.	Hamburg (Blohm&Voss)	1906	1908	..	6–3 K.S.	2	6–4¾	..	6¾	..	8 *8·2-in.*, 6 *5·9-in.*, *3·4-in.*, 14 smaller	20	4	22·5	800§ 2000	650
b.	Schlesien	13,040	398½	72¾	25¼	16,939 T.S. & C.	Schichau Germania	1906	1908	1,214,000	9½–4 K.S.	3	8 K.S.	6 K.S.	11–6 K.S.	6¾ K.S.	4 *11-in.*, 14 *6·7-in.*, *3·4-in.*, 4 *1·4*, 4 M.	20 (sub.)	6	19·2 19·5 *t.*	700 1800◊	736
b.	Schleswig-Holstein																					
b	Schwaben	11,643	393¾	68¼	24¾	14,000 C.&T.S.	Wilhelms-haven	1901	1903	1,061,250	9–4 K.S.	3	5½ K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 *9·4-in.*, 18 *5·9-in.*, *3·4-in.*, 12 *1·4-in.*, 8 M.	12 (5sub.)	6	18·0	700 1450◊	715
b.	Thüringen*	22,000	490	90	27½	22,000	Bremen (Weser)	1909	..	..	12–4	..	..	..	..	..	12 *12-in.*, 14 *5·9-in.*, *4·1-in.*	20	6	20	950	950
a. c.	Von der Tann*	19,000	560	85	27	44,000 (turbines)	Hamburg (Blohm&Voss)	1909	..	1,833,000	8 K.S.	..	..	..	..	..	12 *11-in.*, 12 *5·9-in.*, *3·4-in.*	16	5	25·0	..	..
b.	Weissenburg	9874	354¼	65	24¾	9000	Stettin (Vulcan)	1891	1893	659,475‡	15¾	2½	..	..	11¾	1½	6 *11-in.*, 8 *4·1-in.*, 8 *3·4-in.*, 12 *1·4-in.*, 8 M., 2 l.	3 (sub.)	16·0	680 800	552
b.	Westfalen	18,200	455	88½	26½	26,792 (*t*)	Bremen (Weser)	1908	1910	1,825,000	12–4	..	..	..	11	..	12 *11-in.*, 12 *5·9-in.*, *3·4-in.*	16	6	20·2 *t*	950 2700	961
b.	Wettin	11,643	393¾	68¼	24¾	14,000 C.&T.S.	Schichau	1901	1902	1,071,250	9–4 K.S.	3	5½ K.S.	6 K.S.	10 K.S.	6 K.S.	4 *9·4-in.*, 18 *5·9-in.*, *3·4-in.*, 12 *1·4-in.*, 8 M.	12 (5sub.)	6	18·0	700 1450◊	715
b.	Wittelsbach						Wilhelms-haven	1900	1902	1,071,250												
b.	Wörth	9874	354¼	65	24½	10,224 (*t*)	Kiel	1892	1894	595,250‡	15¾	2½	..	..	11¾	1½	6 *11-in.*, 8 *4·1-in.*, 8 *3·4-in.*, 12 *1·4-in*, 8 M., 2 l.	3 (sub.)	17·2	680 800	552
a. c.	Yorck	9350	403¼	65½	24	19,183 Dürr.	Hamburg (Blohm&Voss)	1904	1905	875,000	4–3 K.S.	2	6 K.S.	4 K.S.	6 K.S.	4 K.S.	4 *8·2-in.*, *10 5·9-in.*, *3·4-in.*, 10 *1·4-in.*, 4 M.	16 (sub.)	4	21·1 *t*	750 1600◊	550
b.	Zähringen	11,643	393¾	68¼	24¾	15,000 C.&T.S.	Kiel (Germania)	1901	1902	1,071,250	9–4 K.S.	3	5½ K.S.	6 K.S.	10 K.S.	6 K.S.	4 *9·4-in.*, 18 *5·9-in.*, *3·4-in.*, 12 *1·4-in.*, 8 M.	12 (5sub.)	6	19·0	650 1000◊	715

* Particulars doubtful. ‡ Exclusive of armament. ◊ Also liquid fuel.

The programme for 1910 includes three battleships to replace the Hagen, Aegir, and Odin; and the cruiser-battleship J.

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GERMANY.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
3rd cl. *cr.*	Amazone . . shd.	2618	328	38½	16	8000 T.S.	Kiel (Germania) .	1900	1901	247,000	2	..	10 *4·1-in.*, 14 *1·4-in.*, 4 M., 2 l.	2 (sub.)	21·5 *t*	560	249
„ „	Arcona . . shd.	2657	328	38½	16	8000 T.S.	Bremen (Weser) .	1902	1903	254,500	2	..	10 *4·1-in.*, 12 *1·4-in.*, 4 M., 2 l.	2 (sub.)	21·0	700	249
„ „	Ariadne . . shd.	2618	328	38½	16	8000 T.S.	Bremen (Weser) .	1900	1901	247,000	2	..	10 *4·1-in.*, 14 *1·4-in.*, 4 M., 2 l.	2 (sub.)	22·0	560	249
„ „	Augsburg . . .	4261	401¾	46	16½	20,000 (tur.)	Kiel . . .	1909	..	..	..	..	12 *4·1-in.*, 4 *2·2-in.* .	4 (sub.)	27	..	..
„ „	Berlin. . . shd.	3200	341	43¼	16½	11,000 T.S.	Danzig . .	1903	1904	254,500	2	..	10 *4·1-in.*, 10 *1·4-in.*, 4 M., 2 l.	2 (sub.)	23·2 *t*	800	286
„ „	Bremen . . .	3200	341	43¼	16½	10,000 T.S.	Bremen (Weser) .	1903	1904	254,500	2	..	10 *4·1-in.*, 10 *1·4-in.*, 4 M., 2 l.	2 (sub.)	23·0	800	286
„ „	Bussard . . .	1555	256	30¼	18¼	2900	Danzig . .	1890	1890	..	3	..	8 *4·1-in.*, 7 M. . .	2	16·5 *t*	300	165
„ „	Bussard (Ersatz)† .	..	..	..	..	..	Bremen (Weser) .	..	..	..	..	..	.. ..	..	..	..	..
to. g. b. .	Comet . . .	971	262½	31¼	13¾	5000	Stettin (Vulcan) .	1892	1896	..	2	..	4 *3·4-in.*, 2 M. . .	3	21·0 *t*	120	115
3rd cl. *cr.*	Condor * . . .	1614	246	33½	15	2930	Hamburg . .	1892	1892	..	3	..	8 *4·1-in.*, 7 M. . .	2	16·5 *t*	300	165
3rd cl. *cr.*	Cormoran * . .	1614	246	33½	15	2930	Danzig . . .	1892	1893	..	3	..	8 *4·1-in.*, 7 M. . .	2	16·0	300	165
3rd cl. *cr.*	Danzig . . .	3200	341	43¼	16½	10,000 T.S.	Danzig . . .	1905	1906	254,500	2	..	10 *4·1-in.*, 10 *1·4-in.*, 4 M., 2 l.	2 (sub.)	23·0	800	286
3rd cl. *cr.*	Dresden . . .	3544	364	44¼	15⅝	15,000 (tur.)	Hamburg . .	1907	1908	..	..	..	10 *4·1-in.*, 12 smaller and M. . . .	..	27·0	900	..
g.b. .	Eber	977	206¾	30¼	10¾	1300 T.S.	Danzig . . .	1903	1904	91,000	..	..	8 *3·4-in.*, 6 *1·4-in.*, 2 M.	..	13·0	240	121
3rd cl. *cr.*	Emden . . .	3544	364	44¼	15⅝	15,000 (tur.)	Danzig . . .	1908	1909	..	..	..	10 *4·1-in.*, 12 smaller and M.	2	25·0	900	..
3rd cl. *cr.*	Falke	1555	246	33½	15	2900	Kiel . . .	1891	1892	..	3	..	8 *4·1-in.*, 7 M. . .	2	15·5 *t*	300	165
„ „	Falke (Ersatz)† . .	..	..	..	..	..	Stettin (Vulcan) .	..	..	..	..	..	.. ..	..	..	..	..

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3rd cl. *cr.*	**Frauenlob**	shd.	2657	328	38½	16	8000 T.S.	Bremen (Weser)	1902	1904	254,500	2	..	10 *4·1-in.*, 12 *1·4-in.*, 4 M., 2 l.	2 (sub.)	21·0	700	249
2nd cl. *cr.*	**Freya**		5569	344½	57	20¾	10,000 Nic.	Danzig	1897	1898	..	4 N.S.	4 N.S.	2 *8·2-in.*, 6 *6-in.*, 10 *3·4-in.*, 10 *1·4-in.*, 4 M.	3 (sub.)	19·5 *t*	825	465
3rd cl. *cr.*	**Gazelle**	shd.	2603	328	38½	16¾	6400 Nic.	Kiel (Germania)	1898	1898	225,000	2	..	10 *4·1-in.*, 14 *1·4-in.*, 4 M., 2 l.	2 (sub.)	18·0	560	210
3rd cl. *cr.*	**Gefion**		3705	344½	42¾	20¾	9000	Danzig (Schichau)	1893	1894	..	1½	..	10 *4·1-in.*, 6 *2·1-in.*, 1 l., 8 M.	2	19·0	780	302
„ „	**Geier**	shd.	1597	249¼	34¾	15½	2960	Wilhelmshaven	1894	1896	..	3	..	8 *4·1-in.*, 7 M.	2	16·2 *t*	300	165
„ „	**Hamburg**	shd.	3200	341	43¼	16½	11,500 T.S.	Stettin (Vulcan)	1903	1904	254,500	2	..	10 *4·1-in.*, 10 *1·4-in.*, 4 M., 2 l.	2 (snb.)	23·28 *t*	800	249
2nd cl. *cr.*	**Hansa**	shd.	5791	345½	57¾	21¾	10,000 B.	Stettin (Vulcan)	1898	1899	..	4 N.S.	4 N.S.	2 *8·2-in.*, 8 *6-in.*, 10 *3·4-in.*, 10 *1·4-in.*, 4 M.	3 (sub.)	19·5	825	465
d.v.	**Hela**		2004	328	36	14¾	5860	Bremen (Weser)	1895	1896	..	1½	..	4 *3·4-in.*, 6 *1·9-in.*, 2 M.	3	20·0	500	178
2nd cl. *cr.*	**Hertha**		5569	344½	57	21¾	10,000 B.	Stettin (Vulcan)	1897	1898	..	4 N.S.	4	2 *8·2-in.*, 8 *6-in.*, 10 *3·4-in.*, 10 *1·4-in.*, 4 M.	3 (sub.)	19·5 *t*	825	465
g. b.	**Iltis**	shd.	881	203½	29¾	10¾	1300 T.	Danzig (Schichau)	1898	1898	100,000	..	..	8 *3·4-in.*, 6 *1·4-in.*, 2 M.	..	13·5 *t*	165	121
3rd cl. *cr.*	**Irene**	shd.	4224	308	46	21	8000	Stettin (Vulcan)	1887	1888	220,000	3	..	4 *5·9-in.*, 8 *4·1-in.*, 6 *1·9-in.*, 1 l., 8 M.	3	19·8 *t*	540	365
g. b.	**Jaguar**	shd.	900	203½	29¾	10¾	1300 T.	Danzig (Schichau)	1898	1899	90,000	..	..	8 *3·4-in.*, 6 *1·4-in.*, 2 M.	..	13·5 *t*	165	121
2nd cl. *cr.*	**Kaiserin Augusta**	shd.	5956	387	52½	23	14,000	Kiel (Germania)	1892	1896	..	3½	..	12 *5·9-in.*, 8 *3·4-in.*, 2 l., 8 M.	3	21·0	850	436
3rd cl. *cr.*	**Kolberg**		4232	388¼	46	16½	20,000 (tur.)	Danzig (Schichau)	1908	1910	..	2	..	12 *4·1-in.*, 4 *2·2-in.*, 4 M.	2 (sub.)	25·5	..	326
„ „	**Köln**		4261	401¾	46	16½	20,000 (tur.)	Kiel (Germania)	1909	1910	..	..	..	12 *4·1-in.*, 4 *2·2-in.*, 4 M.	4 (sub.)	27·0	..	..
„ „	**Königsberg**		3350	354¼	43½	15¾	13,200 T.S.	Kiel	1906	1907	..	..	..	10 *4·1-in.*, 8 *2·2-in.*, 4 M.	2 (sub.)	23·5	4 00 850	295
„ „	**Leipzig**		3200	341	43¼	16½	11,000	Bremen (Weser)	1905	1906	254,500	2	..	10 *4·1-in.*, 10 *1·4-in.*, 4 M., 2 l.	2 (sub.)	23·0	800	286
„ „	**Lübeck**		3200	341	43¼	16½	14,000 T.S. tur.	Stettin (Vulcan)	1904	1906	254,500	2	..	10 *4·1-in.*, 10 *1·4-in.*, 4 M., 2 l.	2 (sub.)	23·0	800	286
g. b.	**Luchs**		962	206¾	30¼	10¾	1300 T.S.	Danzig	1899	1900	91,000	..	..	8 *3·4-in.*, 6 *1·4-in.*, 2 M.	..	13·5 *t*	240	121
3rd cl. *cr.*	**Mainz**		4232	388¼	46	16½	20,000 (tur.)	Stettin (Vulcan)	1909	1910	..	2	..	12 *4·1-in.*, 4 *2·2-in.*, 4 M.	2 (sub.)	28·0 *t*	..	326
„ „	**Medusa**	shd.	2618	328	38½	16	8000 T.S.	Bremen (Weser)	1900	1901	247,000	2	..	10 *4·1-in.*, 14 *1·4-in.*, 4 M., 2 l.	2 (sub.)	22·0	560	249
„ „	**München**	shd.	3200	341	43¼	16½	11,000 T.S.	Bremen (Weser)	1904	1905	254,500	..	..	10 *4·1-in.*, 10 *1·4-in.*, 4 M., 2 l.	2 (sub.)	23·4 *t*	800	286

* The programme for 1910 includes two third-class cruisers to replace the Condor and Cormoran.

† Programme 1909.

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GERMANY.—Cruising Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			kts.	tons.	
3rd cl. *cr.*	**Niobe** . . . shd.	2603	328	38½	15	8000 T.S.	Bremen (Weser) .	1899	1901	217,500	2	..	10 *4·1-in.*, 14 *1·4-in.*, 4 M., 2 l.	2 (1sub.)	20·0	560	250
„ „	**Nymphe** . . shd.	2618	328	38½	15	8000 T.S.	Kiel (Germania) .	1899	1901	217,500							
„ „	**Nürnberg** . . .	3396	354¼	43½	15¾	13,200 T.S.	Kiel . . .	1906	1908	..	..	..	10 *4·1-in.*, 8 *2·2-in.*, 4 M.	2 (sub.)	23·5	400 850	295
g. b. .	**Panther** . . .	962	206¾	30½	10¾	1300 T.S.	Danzig . . .	1901	1902	91,000	..	..	8 *3·4-in.*, 6 *1·4-in.*, 2 M.	..	13·5 *t*	240	121
cr. .	**Pelikan** (mining ship) .	2215	259	38	14½	3000	Kiel . . .	1890	1891	..	..	..	4 *3·4-in.*, 4 M. . .	..	15·4 *t*	370	183
3rd cl. *cr.*	**Prinzess Wilhelm** shd.	4224	339½	46	21	8000	Kiel (Germania) .	1887	1888	220,000	3	..	4 *5·9-in.*, 8 *4·1-in.*, 6 *1·9-in.*, 1 l., 8 M.	3	18·7 *t*	540	365
3rd cl. *cr.*	**Seeadler** . . .	1614	246	33½	15	2800	Hamburg . .	1892	1892	..	3	..	8 *4·1-in.*, 7 M. . .	2	16·0	300	165
3rd cl. *cr.*	**Stettin** . . .	3396	354¼	43½	15¾	13,200 T.S. tur.	Stettin (Vulcan) .	1907	1907	..	..	..	10 *4·1-in.*, 8 *2·2-in.*, 4 M.	2 (sub.)	23·5	400 850	295
3rd cl. *cr.*	**Stuttgart** . . .	3396	354¼	43½	15¾	13,200 T.S. tur.	Kiel . . .	1906	1908	..	..	..	10 *4·1-in.*, 8 *2·2-in.*, 4 M.	2 (sub.)	23·3 *t*	400 850	295
3rd cl. *cr.*	**Thetis** . . . shd.	2618	344½	38½	16	8000 T.S.	Danzig . . .	1900	1901	247,000	2	..	10 *4·1-in.*, 14 *1·4-in.*, 4 M., 2 l.	2 (sub.)	21·8 *t*	560	249
g. b. .	**Tiger**	962	203½	29¾	10	1300 T.S.	Danzig . . .	1899	1900	..	..	..	8 *3·4-in.*, 6 *1·4-in.*, 2 M.	..	13·5 *t*	240	121
3rd cl. *cr.*	**Undine** . . shd.	2657	328	38½	16	8000 T.S.	Kiel (Howaldt) .	1902	1904	254,500	2	..	10 *4·1-in.*, 12 *1·4-in.*, 4 M., 2 l.	2 (sub.)	21·0	700	249
2nd cl. *cr.*	**Victoria Luise** . .	5569	344½	57	21¾	10,000 Dürr.	Bremen (Weser) .	1897	1898	..	4 H.S.	4 H.S.	2 *8·2-in.*, 8 *6-in.*, 10 *3·4-in.*, 10 *1·4-in.*, 4 M.	3 (sub.)	19·5 *t*	825	465
„ „	**Vineta** . . shd.	5791	345½	57¾	21¾	10,000 Dürr.	Danzig . . .	1897	1899	..	4 H.S.	4 H.S.	2 *8·2-in.*, 8 *6-in.*, 10 *3·4-in.*, 10 *1·4-in.*, 4 M.	3 (sub.)	19·5 *t*	825	465

The Imperial Yacht Hohenzollern, 4187 tons, 9460 I.H.P., 22 knots, carries 3 4·1-in., 12 1·9-in. Q.F. and 4 M. River gunboats for China, the Tsingtau, Vaterland Vorwärtz (168 tons), Otter (270 tons). The mining vessels Nautilus and Albatross (2000 tons). Gunnery tender Drache, 765 tons, 15 knots. Submarine salvage vessel Vulkan.

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Merchant Cruisers (Auxiliaries to the German Navy).

To what Company belonging.	Name of Ship.	Register Tonnage.	Length.	Beam.	Draught of Water.	Indicated H.P.	Ocean Speed.	When Built.	Armament of each Ship.
		tons.	ft. in.	ft. in.	ft. in.		knots.		
North German Lloyd	Kronprinzessin Caecilie .	19,500	678 0	72 0	29 0	45,000	23½	1906	The armament is of 6-in. and smaller quick-firers.
	Kaiser Wilhelm II. . .	19,500	678 0	72 0	29 0	45,000	23½	1901	
	Kronprinz Wilhelm .	14,800	640 0	66 0	26 3	30,000	23	1901	
	Kaiser Wilhelm der Grosse	14,349	625 0	66 0	27 0	30,000	23	1897	
	Trave	5262	436 6	48 0	..	7500	18	1886	
Hamburg-America	Deutschland . . .	16,500	662 6	67 0	..	37,000	23½	1900	

Many other vessels of less than 18 knots speed are in the list, including the Berlin (19,200 register tons), 17 knots, launched at Gröpelingen, 1908.

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GREECE.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position.		Guns.	Torpedo Tubes.			
															Heavy Guns.	Secondary.					
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	Giorgio Averoff .	9900	429¾	68¼	24¾	20,000 B	Leghorn (Orlando)	1910	..	950,750	8–3½ K.S.	1¾	7	7	7–6	..	4 *9·2-in.*, 8 *7·5-in.*, 16 *3-in.*, 8 *1·8-in.*	3 (sub.)	24·0	700	..
b.	Hydra . .	4808	334½	51¾	23¼	7000	St. Nazaire La Seyne .	1889	1891 1900	..	11¾–4	2½	3	..	13½	..				1600	
„	Psara . . .	4808	334½	51¾	23¼	7000	Havre . . La Seyne .	1890	1892 1897	..	11¾–4	2½	3	..	13½	..	3 *10·6-in.* Canet, 5 *5·9-in.*, 1 *3·9-in.*, 8 *2·5-in.*, 4 *1·8-in.*, 12 *1·4-in.*	3	17·0	600	400
„	Spetsai . .	4808	334½	51¾	23¼	7000	Havre . . La Seyne .	1889	1891 1900	..	11¾–4	2½	3	..	13½	..					

GREECE.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.						in.	in.			knots.	tons.	
g.v.	Acheloos . . .	420	130	24½	11½	400	Blackwall .	1884	1885	..	..	..	2 *3·7-in.* (K.), 3 M.. .	..	10·0	50	..
„	Alphios . . .	420	130	24½	11½	400	Blackwall .	1884	1885	..	..	..	2 *3·7-in.* (K.), 3 M.. .	..	10·0	50	..
„	Eurotas . . .	420	130	24½	11½	400	Dumbarton .	1884	1885	..	..	..	2 *3·7-in.* (K.), 3 M.. .	..	10·0	50	..
corv.	Sfaktirea . . .	1000	216½	29¾	18	2400	England . .	1885	1886	..	..	..	2 *3·9-in.* (K.), 2 M.. .	..	14·5	100	..

Torpedo depôt-ship.—Kanaris, 1100 tons, 500 I.H.P., 2 3·9-in. (Krupp) guns, 14 knots speed. Gunboats, Ambrakia and Aktion, of 440 tons displacement, 380 horse-power, 10 knots speed, fitted with 1 10·2-in. Krupp gun and 2 machine guns; launched 1885.

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ITALY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	ins.	ins.	ins.	ins.	ins.			knots.	tons.	
a.c.	**Amalfi** . . .	9832	429¾	68¾	24¼	20,800 B.	Genoa (Odero)	1908	1909	880,000	8–3½ K.S.	1¾	7 K.S.	7 K.S.	7–6 K.S.	..	4 *10-in.*, 8 *7·5-in.*, 16 *3-in.*, 2 M.	3 (2sub.)	23·6 *t*	700 1500	..
b.	**Ammiraglio di St. Bon**	9645	344½	69¼	24¾	13,500	Venice . .	1897	1901	..	9¾–4 H.S.	3–1½	6 H.S.	6 H.S.	9¾ H.S.	6 H.S.	4 *10-in.*, 8 *6-in.*, 8 *4·7-in.*, 2 *2·9-in.*, 8 *2·2-in.*, 12 *1·4-in.*, 2 M.	4	18·3 *t*	600	548
b.	**Benedetto Brin** . .	13,214	426½	78¼	27¼	20,400 B.	Castellammare	1901	1904	..	6–2 H.S.	3	6 H.S.	8 H.S.	10 H.S.	6 H.S.	4 *12-in.*, 4 *8-in.*, 12 *6-in.*, 16 *3-in.*, 8 *1·8-in.*, 4 M.	4 (sub.)	19·5 *t*	1000 2000	811
a.c.	**Carlo Alberto** . .	6396	325	59	23	13,220 *t*	Spezia . .	1896	1898	..	6–4½ H.S.	1½	6 H.S.	..	6 H.S.	4½ shields	12 *6-in.*, 6 *4·7-in.*, 2 *2·9-in.*, 10 *2·2-in.*, 10 *1·4-in.*, 2 M.	4	19·2 *t*	1000	500
b.	**Conte di Cavour** * .	21,500	492	..	..	30,000	Spezia . .	Bldg.	..	..	..	..	..	..	..	..	13 *12-in.*, 18 *4·7-in.*, 16 *12-pr.*	3 (sub.)	23	..	..
b.	**Dante Alighieri*** .	21,500	492	..	..	30,000	Castellammare	Bldg.	..	..	..	..	..	..	..	..	12 *12-in.*, 18 *4·7-in.*, 16 *12-pr.*	3 (sub.)	23	..	..
b.	**Emanuele Filiberto** .	9645	344½	69¼	24¾	13,500	Castellammare	1897	1902	..	9¾–4 H.S.	3–1	6 H.S.	6 H.S.	9¾ H.S.	6 H.S.	4 *10-in.*, 8 *6-in.*, 8 *4·7-in.*, 2 *2·9-in.*, 8 *2·2-in.*, 12 *1·4-in.*, 2 M.	4	18·3 *t*	600	536
a.c.	**Francesco Ferruccio**	7294	344	59¾	23¼	13,500 Nic.	Venice . .	1902	1904	..	6–3 H.S.	1½	6 H.S.	5 H.S.	6 H.S.	6 H.S.	1 *10-in.*, 2 *8-in.*, 14 *6-in.*, 10 *2·9-in.*, 6 *1·8-in.*, 2 M.	4 (sub.)	20·0	655 1200	540
b.	**Giuseppe Garibaldi**					14,713 *t* Nic.	Sestri-Ponente (Ansaldo)	1899	1901												
„	**Giulio Cesare** * .	21,500	492	..	..	30,000	Sestri-Ponente (Ansaldo)	Pro.		..	..	..	..	..	..	..	13 *12-in.*, 18 *4·7-in.*, 16 *12-pr.*	3 (sub.)	23	..	..
„	**Leonardo da Vinci** *					30,000	Genoa (Odero)	Pro.													
a.c.	**Marco Polo** . .	4511	327	48¼	19½	10,543 *t*	Castellammare	1892	1895	344,400	4	1	4	4	4	..	6 *5·9-in.*, 10 *4·7-in.*, 2 *2·9-in.*, 9 *2·2-in.*, 4 *1·4-in.*, 2 M.	4 (1sub.)	19·0 *t*	600	394
b.	**Napoli** . .	12,425	435½	73½	27¼	20,000 B.&W.	Castellammare	1905	1909	1,120,000	9¾–4 H.S.	2	8 H.S.	8 H.S.	8 H.S.	6 H.S.	2 *12-in.*, 12 *8-in.*, 12 *3-in.*, 12 *1·8-in.*	2 (sub.)	22·0	1000 2000	711
	Regina Elena .					20,000 B.	Spezia . .	1904	1907												

* Particulars of armament uncertain.

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ITALY.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun. Position. Heavy Guns.	Gun. Position. Secondary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			kts.	tons.	
a.c.	Pisa	9832	429¾	68¾	24¾	18,000 B.	Leghorn (Orlando)	1907	1909	..	8–3½ K.S.	1¾	7 K.S.	7 K.S.	7–6 K.S.	..	4 *10-in.*, 8 *7·5-in.*, 16 *3-in.*, 2 M.	3 (2sub.)	23·0	700 / 1600	..
b.	Regina Margherita	13,214	426½	78¼	27¼	20,664 Nic.	Spezia	1901	1904	..	6 H.S.	3	6 H.S.	8 H.S.	8 H.S.	6 H.S.	4 *12-in.*, 4 *8-in.*, 12 *6-in.*, 16 *3-in.*, 8 *1·8-in.*, 4 M.	4 (sub.)	20·2 *t*	1000 / 2000	811
,,	Re Umberto	13,673	400	76¾	28½	19,500	Castellammare	1888	1893	1,058,500	4	3	4	2¾	18	..	4 *67-ton* (A.), 8 *6-in.*, 16 *4·7-in.*, 2 *9-in.*, 15 *2·2-in.*, 14 *1·4-in.*, 2 M.	5	19·0	1200	785
,,	Roma	12,425	435½	73½	27¼	20,000 B. & W.	Spezia	1907	1909	1,120,000	9¾–4 H.S.	2	8 H.S.	8 H.S.	8 H.S.	6 H.S.	2 *12-in.*, 12 *8-in.*, 12 *3-in.*, 12 *1·8-in.*	2 (sub.)	22·0	1000 / 2000	711
a.c.	San Giorgio / San Marco	9832	429¾	68¾	24¾	18000 Bl. / 18000 tur.	Castellammare	1908	..	..	8–3½ K.S.	1¾	7 K.S.	7 K.S.	7–6 K.S.	7 K.S.	4 *10-in.*, 8 *7·5-in.*, 16 *3-in.*, 8 *1·8-in.*	3 (2sub.)	22·5	700 / 1600	643
b.	Sardegna	13,640	411	76¾	28½	19,650 *t*	Spezia	1890	1895	1,057,440	4	3	4	2¾	14¼ *comp.*	..	4 *67-ton* (A.), 8 *5·9-in.*, 16 *4·7-in.*, 2 *2·9-in.*, 20 *2·2-in.*, 10 *1·4-in.*, 2 M.	5	20·1 *t*	1200	785
,,	Sicilia	13,087	400	76¾	28½	19,500	Venice	1891	1895	1,050,000	4	3	4	2¾	18 *comp.*	..	4 *67-ton* (A.), 8 *5·9-in.*, 16 *4·7-in.*, 2 *2·9-in.*, 20 *2·2-in.*, 10 *1·4-in.*, 2 M.	5	19·2 *t*	1200	785
a.c.	Varese	7294	344	59¾	23⅓	13,500 B.	Leghorn (Orlando)	1899	1900	..	6–4½ H.S.	1½	6 H.S.	5 H.S.	6 H.S.	6 H.S.	1 *10-in.*, 2 *8-in.*, 14 *6-in.*, 10 *2·9-in.*, 6 *1·8-in.*, 2 M.	4	20·0	650 / 1200	500
a.c.	Vettor Pisani	6396	325	59	23	13,000	Castellammare	1895	1897	..	6 H.S.	1½	6 H.S.	..	6 H.S.	4½ shields	12 *6-in.*, 6 *4·7-in.*, 2 *2·9-in.*, 10 *2·2-in.*, 10 *1·4-in.*, 2 M.	4	20·0	600	504
b.	Vittorio Emanuele III	12,425	435½	73½	27¼	20,000 B.	Castellammare	1904	1907	1,120,000	9¾–4 H.S.	2	8 H.S.	8 H.S.	8 H.S.	6 H.S.	2 *12-in.*, 12 *8-in.*, 12 *3-in.*, 12 *1·8-in.*	2 (sub.)	22·0	1000 / 2000	711

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ITALY.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armaments.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
to.cr.	Agordat	1292	287½	30½	11	8000	Castellammare	1899	1900	..	1	..	4 *4·7-in.*, 8 *2·2-in.*, 2 *1·4-in.*	2	22·0	160	158
to.g.b.	Aretusa	833	230	26¾	11¾	4420	Leghorn (Orlando)	1891	1892	72,920	1	..	1 *4·7-in.*, 6 *2·2-in.*, 3 *1·4-in.*	6	20·7 *t*	120	111
3rd cl. *cr.*	Calabria	2428	249½	42	16¾	4094 *t*	Spezia	1894	1897	183,120	2	..	4 *5·9-in.*, 6 *4·7-in.*, 1 *2·9-in.*, 8 *2·2-in.*, 8 *1·4-in.*, 2 M.	2	16·4 *t*	500	257
to.g.b.	Caprera	833	230	27½	10½	4189	Leghorn (Orlando)	1894	1895	72,920	1	..	2 *4·7-in.*, 4 *2·2-in.*, 2 *1·4-in.*	5	21·0	120	111
to.cr.	Coatit	1292	287½	30½	11	8160	Castellammare	1899	1902	..	1	..	4 *4·7-in.*, 8 *2·2-in.*, 2 *1·4-in.*	2	21·1 *t*	160	158
3rd cl. *cr.*	Elba shd.	2689	272½	40¾	16½	7471 *t*	Castellammare	1893	1895	200,000	2	4½	4 *5·9-in.*, 6 *4·7-in.*, 1 *2·9-in.*, 8 *2·2-in.*, 8 *1·4-in.*, 2 M.	2	17·9 *t*	500	272
„ „	Etruria	2245	262½	39½	16½	7585 *t*	Leghorn (Orlando)	1891	1893	183,120	2	4½	4 *5·9-in.*, 6 *4·7-in.*, 1 *2·9-in.*, 8 *2·2-in.*, 10 *1·4-in.*, 2 M.	2	19·8¼ *t*	400	257
g.v.	Governolo	1235	185	33¾	13¾	1100	Venice	1894	1896	58,440	..	..	4 *4·7-in.*, 4 *2·2-in.*, 2 *1·4-in.*, 2 M.	..	13·0	200	131
to.g.b.	Iride	931	229½	27	10½	4242	Castellammare	1891	1892	72,920	1	..	1 *4·7-in.*, 6 *2·2-in.*, 3 *1·4-in.*	6	19·6 *t*	120	111
3rd cl. *cr.*	Liguria	2245	262½	39¼	16¾	7677 *t*	Sestri (Ansaldo)	1893	1894	183,120	2	4½	4 *5·9-in.*, 6 *4·7-in.*, 1 *2·9-in.*, 8 *2·2-in.*, 10 *1·4-in.*, 2 M.	2	19·6 *t*	430	257
„ „	Lombardia	2351	262½	39½	16½	6843 *t*	Castellammare	1890	1892	183,120	2	4½	4 *5·9-in.*, 6 *4·7-in.*, 1 *2·9-in.*, 8 *2·2-in.*, 8 *1·4-in.*, 2 M.	2	17·0 *t*	430	257

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ITALY.—Cruising Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
Scout .	**Marsala.** . .	3600	..	..	..	28,000	Castellammare .	Pro.	..	..	..	..	*4·7-in.* and *12-pr.*	..	28·0	..	..
to g.b. .	**Minerva** . .	833	246	27½	11¾	4800 W.T.	Sestri (Ansaldo) .	1892	1893	72,720	1	..	1 *4·7-in.*, 6 *2·2-in.*, 3 *1·4-in.*	5	21·0	120	111
to.g.b. .	**Montebello** (miner).	801	230	25½	11¾	2776	Spezia . . .	1888	1899	74,120	..	1	6 *2·2-in.*, 2 *1·4-in.* . .	4	18·0	100	111
Scout .	**Nino Bixio** . .	3600	..	..	..	28,000	Castellammare .	Pro.	..	..	..	..	*4·7-in.* and *12-pr.*	..	28·0	..	..
to.g.b. .	**Partenope** (miner) .	821	246	27½	11¾	4200	Castellammare .	1890	1890	71,000	..	1	1 *4·7-in.*, 6 *2·2-in.*, 3 *1·4-in.*	4	19·0	100	111
3rd cl. *cr.*	**Puglia** . . .	2498	269	41	16¾	7000	Taranto. . .	1898	1900	200,000	4½	1	4 *5·9-in.*, 6 *4·7-in.*, 1 *2·9-in.*, 8 *2·2-in.*, 8 *1·4-in.*, 2 M.	2	20·0	650	257
Scout .	**Quarto** . . .	3600	..	..	..	28,000	Venice . . .	Bldg.	..	..	..	..	*4·7-in.* and *12-pr.*	..	28	..	..
3rd cl. *cr.*	**Umbria** . .	2245	262½	39½	16½	7104	Leghorn (Orlando).	1891	1893	183,120	4½	2	4 *5·9-in.*, 6 *4·7-in.*, 8 *2·2-in.*, 10 *1·4-in.*, 1 l., 2 M.	2	18·83 t	430	257
to.g.b. .	**Urania** . . .	833	230	27	11¼	4397	Sestri (Odero) .	1891	1892	72,920	..	1	1 *4·7-in.*, 6 *2·2-in.*, 3 *1·4-in.*	6	20·0	120	111
3rd cl. *cr.*	**Vesuvio.** . .	3373	282¼	42½	19	6820	Leghorn (Orlando) .	1886	1888	218,320	5	1·5	2 *9·8-in.*, 6 *5·9-in.*, 1 *2·9-in.*, 5 *2·2-in.*, 8 *1·4-in.*, 2 M.	2	17·0	600	315
g.v. .	**Volturno** . .	1155	177¼	32¾	14½	1100	Venice . . .	1887	1888	58,960	..	..	4 *4·7-in.*, 4 *2·2-in.*, 2 *1·4-in.*, 2 M.	..	13·0	206	131

Etna (3474 tons), converted into a training ship. Goito and Tripoli, mining vessels. *Subsidised auxiliary cruisers and despatch vessels.*—Nord America (La Veloce S.S. Co.), Regina Margherita, Galileo Galilei, Marco Polo, Umberto I., Cristoforo Colombo, Elettrico, Candia, Malta, Perseo, Orione, and some others (Navigazione Generale), Principessa Mafalda (18½ knots) Italian Lloyd. The armament of these vessels is 2 2·2-in. Q.F., and 4 1·4-in. M. The coal and liquid fuel transports Bronte and Sterope (9490 tons) are completed. Provision is made for a docking vessel for submarines, and a river gunboat. The lagoon gunboat Brondolo is to be completed in 1910 and the Marghera in 1911.

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JAPAN.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.						in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	**Adzuma** . .	9436	431½	59½	24¾	17,000 B.	St. Nazaire .	1899	1901	..	7-3½ H. S.	3	5 H.S.	..	6 H. S.	6 H.S.	4 *8-in.*, 12 *6-in.*, 12 *3-in.*, 8 *1·8-in.*	5 (4 sub.)	20·0	600 1275	482
b.	**Aki** . . .	19,800	482	83½	27½	18,000 My. tur.	Kure . .	1907	..	..	9-5 K. S.	2-3	8	..	9	6	4 *12-in.*, 10 *10-in.*, 8 *6-in.*, 8 *12-pr.*, 4 M.	5 (4 sub.)	20·5	..	..
„	**Asahi** . . .	15,800	400½	75½	27½	15,000 B.	Clydebank .	1899	1900	..	9-4 H. S.	4-2½	6 H.S.	12 H.S.	14 H. S.	6 H.S.	4 *12-in.*, 14 *6-in.*, 20 *12-pr.*, 8 *3-pr.*, 4 2½-*pr.*	4 (sub.)	18	700 1549	750
a.c.	**Asama** . . .	9700	408	67	24¼*	19,000 *t*	Elswick .	1898	1899	..	7-3½ H. S.	2	5 H.S.	..	6	6 H.S.	4 *8-in.*, 14 *6-in.* (A.), 12 *12-pr.*, 8 2½-*pr.*	5 (4 sub.)	22·1 *t*	600 1409	482
„	**Aso** (*ex* Bayan) .	7726	443	55½	22	17,400 My. *t.*	La Seyne .	1900	1902	..	8-3 K.S.	2	3 K.S.	..	7 K.S.	3 K.S.	2 *8-in.*, 8 *6-in.*, 32 *2·9-in.*, 20 *3-pr.*, 6 *1-pr.* 3l., and M.	2 (sub.)	22 *t*	750 11,000	..
a.c.	**Chiyoda** . .	2450	308	42½	14	5700 B.	Clydebank .	1889	1890	..	4½	1-2	..	..	..	..	10 *4·7-in.*, 14 *3-pr.*, 3 M. .	3	17·5	420	300
b.	**Fuji** . . .	12,320	374	73	26½	14,000	Thames .	1896	1897	..	18-6 H. S.	4-2½	4 H.S.	..	14 H. S.	6 H.S.	4 *12-in.*, 10 *6-in.*, 20 *3-pr.*, 4 4½-*pr.*	5 (4 sub.)	19·2 *t*	1100	600
„	**Hizen** (*ex* Retvizan)	12,700	374	72¼	25	16,000 My.	Philadelphia	1900	1902	..	9-4 K.S.	4	6-2 K.S.	9 K.S.	10 K.S.	5 K.S.	4 *12-in.*, 12 *6-in.*, 20 *3-pr.*, 6 *1-pr.*	2	18·0	800 2000	..
a.c.	**Ibuki** . . .	14,620	450½	75½	26½	27,000 My. tur.	Kure . .	1907	1909	..	7-4 K.S.	2	5 K.S.	..	9 K.S.	..	4 *12-in.*, 8 *8-in.*, 12 *4·7-in.*, 3 *1·8-in.*, 2 l., 4 M.	3 (sub.)	22	2000	..
b	**Idzumo** .	9750	400	68½	24¼*	17,300 B. *t.*	Elswick	1899	1901	..	7-3½ H.N.S.	2½	5 H.N.S.	..	6 H. N.S.	6 H.N.S.	4 *8-in.*, 14 *6-in.*, 12 *12-pr.*, 8 2½-*pr.*	4 (sub.)	22·0 21·7 *t*	600 1412	672
„	**Iwate** . .							1900	1901												
b.	**Iki** (*ex* Nicolai I) .	9672	326	67	23	8000 B.	St. Petersburg	1888	1892	..	14-6 *comp.*	2½	..	..	10 *comp.*	6 *comp.*	2 *12-in.*, 4 *9-in.*, 8 *6-in.*, 12 Q.-F., 8 M., 4 l.	6	14·8 *t*	..	600
a.c.	**Ikoma** . .	13,750	440	75	26	20,500	Kure . .	1906	1907	..	7-5 K.S.	..	..	..	7 K.S.	..	4 *12-in.*, 12 *6-in.*, 12 *4·7-in.*, 2 *1·8-in.*, 2 l., 4 M.	3 (sub.)	21·0	..	817
b.	**Iwami** (*ex* Orel) .	13,516	367½	76	26	16,000 My.	St. Petersburg (Galerny)	1902	1904	..	9-4 K.S.	2½-1½	6 K.S.	9 K.S.	10 K.S.	6 K.S.	4 *12-in.*, 6 *8-in.*, 20 *3-in.*, 20 *3-pr.*, 6 *1-pr.*	3 (2 sub.)	18·0	800 2000	740
„	**Kashima** . .	16,400	425	78⅛	26½	17,280 Nic.	Elswick .	1905	1906	..	9-4 K.S.	3-2½	6	6	9 K.S	6 K.S.	4 *12-in.*, 4 *10-in.*, 12 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 6 M., 2 l.	5 (sub.)	19·2 *t*	750 2150	980

* Mean draught.

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JAPAN.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.						in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	**Kasuga** . .	7299	344	59¾	24½	13,500	Sestri Ponente	1902	1904	760,000	6 H. N.S.	1½	6 H. N.S.	6 H. N.S.	6 H. N.S.	6 H. N.S.	1 *10-in.*, 2 *8-in.*, 14 *6-in.*, 10 *3-in.*, 6 *1·8 in.*, 2 M.	4	20·0	600 / 1150	500
b.	**Katori** . . .	15,950	420	78	27*	18,500 *t.* Nic.	Barrow .	1905	1906	..	9–5 K.S.	3–2	6	6	10 K.S.	6 K.S.	4 *12-in.*, 4 *10-in.*, 12 *6-in.*, 10 *12-pr.*, 3 *3-pr.*, 6 M., 2 l.	5 (sub.)	19·5 *t*	750 / 1800	980
„	**Kawachi** . .	20,800	480	84	28	26,500 tur.	Kure . .	Bldg.	..	..	12–9½ K.S.	..	..	..	..	..	12 *12-in.*, 10 *6-in.*, 12 *4·7-in.*	5 (sub.)	20·5	..	..
a.c.	**Kurama** . .	14,620	450½	75½	26½	27,000 My.	Yokosuka .	1907	..	..	7–4 K. S.	2	5 K.S.	..	9 K. S.	..	4 *12-in.*, 8 *8-in.*, 12 *4·7-in.*, 3 *1·8-in.*, 2 l., 4 M.	3 (sub.)	22·0	2000	..
b.	**Mikasa** . .	15,200	400	76	27½	16,431 B.	Barrow .	1900	1902	..	9–4 H.N.S.	3	6 H. N.S.	12 H. N.S.	14 H. N.S.	6 H. N.S.	4 *12-in.*, 4 *10-in.*, 10 *6-in.*, 20 *12-pr.*, 12 small, 8 M.	(sub.)	18·5 *t*	700 / 1520	935
c.d.	**Minoshima** (*ex* Seniavine)	4792	265	52½	17	5000 My.	St.Petersburg	1894	1895	410,000	10	3	..	..	7–8	..	4 *9-in.*, 4 *4·7-in.*, 6 *1·8-in.*, 8 M.	4	16·0	400	318
a.c.	**Nisshin** . .	7700	344	59¾	24½	13,500	Sestri Ponente	1903	1904	760,000	6 H. N.S.	1½	6 H. N.S.	6 H. N.S	6 H. N.S.	6 H. N.S.	4 *8-in.*, 14 *6-in.*, 10 *3-in.*, 6 *1·8-in.*, 2 M.	4	20·0	600 / 1150	500
c.d.	**Okinoshima** (*ex* Apraxine)	4126	277½	52½	17½	5757 *t.*	St.Petersburg (New Admiralty)	1896	1898	..	10 H. S.	3	..	..	7¾ K. S.	..	3 *10-in.*, 4 *4·7-in.*, 10 *1·8-in.*, 12 *1·4-in.*	4	15·0 *t*	215	318
b.	**Sagami** (*ex* Peresviet)	12,674	401¼	71¾	26	14,500 My.	St.Petersburg (Baltic)	1898	1901	..	9–7 H. S.	2¾	6 H. S.	9 H. S.	9 H. S.	6 H. S.	4 *12-in.*, 11 *6-in.*, 16 *12-pr.*, 10 *3-pr.*, 17 *1-pr.*	5	18·0	800 / 2056	732
„	**Satsuma** . .	19,350	482	83½	27½	18,000 My.	Yokosuka .	1906	1909	..	9–5 K. S.	2–3	8	..	9	6	4 *12-in.*, 12 *10-in.*, 12 *4·7-in.*, 4 *12-pr.*, 4 M.	5 (4 sub.)	20·5	..	..
„	**Settsu** . . .	20,800	480	84	28	26,500 tur.	Yokosuka .	Bldg.	..	..	12–9½ K.S.	...	..	..	..	..	12 *12-in.*, 10 *6-in.*, 12 *4·7-in.*	5 (sub.)	20·5	..	..
„	**Shikishima** .	14,850	400	75¼	26½	16,355 B.	Thames .	1898	1899	..	9–4 H.N.S.	4–2½	6 H. N.S	12 H. N.S.	14	6 H. N.S.	4 *12-in.*, 14 *6-in.*, 20 *12-pr.*, 8 *3-pr.*, 4 *2½-pr.*, 8 M.	5 (4 sub.)	18·3	700 / 1722	741
„	**Suo** (*ex* Pobieda) .	12,674	401¼	71½	26	14,500 My.	St.Petersburg (Baltic)	1900	1901	..	9½–4 H. S.	2¾	9 H. S.	9 H. S.	9 H. S.	6 H. S.	4 *12-in.*, 11 *6-in.*, 16 *12-pr.*, 10 *3-pr.*, 17 *1-pr.*, 2 l.	5	18·0	800 / 2056	732
„	**Tango** (*ex* Poltava)	10,960	367½	69	26	11,255 My.	St.Petersburg	1894	1898	1,098,000	15¾	3½	4	9	10 H. S.	6	4 *12-in.*, 12 *6-in.*, 14 small	4	16·0	900	700
a.c.	**Tokiwa** . .	9700	408	67	24¼*	20,556 *t.*	Elswick .	1898	1899	..	7–3½ H. S.	2	5 H.S.	..	6 H. S.	6 H.S.	4 *8-in.*, 14 *6-in.* (A.), 12 *12-pr.*, 8 *2½-pr.*	5 (4 sub.)	23·0	600 / 1409	500
„	**Tsukuba** . .	13,750	440	75	26	20,500	Kure . .	1905	1907	..	7–5 K. S.	..	..	..	7 K. S.	..	4 *12-in.*, 12 *6-in.*, 12 *4·7-in.*, 2 *1·8 in.*, 2 l., 4 M.	3 (sub.)	21·0	..	817
„	**Yakumo** . .	9850	407¾	64¼	23¾	16,000 B.	Stettin .	1899	1901	..	7–3½ H. S.	2½	5 H.S.	..	6 H. S.	6 H.S.	4 *8-in.* (A.), 12 *6-in.*, 12 *12-pr.* (A.), 8 *2½-pr.*	5 (4 sub.)	20·0	600 / 1100	500

* Mean draught.

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JAPAN.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
Scout	A . . .	5000	..	..	..	22,500 turbines	Kobe .	Bldg. or Pro.	..	..	..	..	2 *6-in.*, 10 *4·7-in.*, 2 *12-pr.* .	2 (sub.)	26	..	..
Scout	B . . .						Nagasaki										
Scout	C . . .						Sasebo .										
g.v.	Akagi . . .	615	164	27	10	700	Yokosuka .	1889	1891	..	..	..	1 *8·2-in.*, 1 *5·9-in.*, 2 l., 2 M.	..	13·0	60	113
cr.	Akashi . . .	2657	295½	41½	16½	8500	Yokosuka .	1897	1898	327,000	2	4½ shield	2 *6-in.* (A.), 6 *4·7-in.*, 10 *3-pr.*, 2 *2½-pr.*, 4 M.	2	20·0	200	..
„	Akitsushima . .	3150	302	42½	18½	8400	Yokosuka .	1892	1893	..	3	..	4 *6-in.*, 6 *4·7-in.*, 10 *3-pr.* .	4	19·0	544 ..	330
t.g.b.	Chihaya . . .	1250	273	31½	10	5500 Nor.	Yokosuka .	1900	1901	..	..	..	2 *4·7-in.*, 4 *12-pr.* . .	5	21·0	123	..
cr.	Chitose . . .	4760	395	49	18	15,500	San Francisco .	1898	1899	205,200	4½	4½ shield	2 *8-in.*, 10 *4·7-in.*, 12 *12-pr.*, 6 *2½-pr.*	4	22·5	344 350 1000	405
„	Hashidate* . .	4277	295	50¾	21½	5400 My.	Yokosuka .	1891	1893	..	2	12	1 *12·5-in.* (Canet), 11 *4·7-in.*, 5 *6-pr.*, 11 *3-pr.*, 6 M.	4	17·0	400	350
„	Itsukushima* . .	4277	295	50¾	21½	5400 B.	La Seyne .	1891	1893	..							
„	Kasagi . . .	5416	374½	48¾	19	13,492	Philadelphia .	1898	1899	205,200	4½–1¾	4½ shield	2 *8-in.*, 10 *4·7-in.*, 12 *12-pr.*, 6 *1·8-in.*	4	22·7 *t*	350 1000	405
t.c.	Katsuraki . .	1476	206¾	36	15	1600	Yokosuka .	1885	1887	..	..	..	2 *6-in.* (K.), 5 *4·7-in.*, 2 M. .	2	13·0	..	242
„	Musashi . .																
t.g.b.	Makigumo . . (*ex* Posadnik)	400	192½	24¼	7½	3600	Elbing .	1892	1892	111,000	..	..	2 *1·8-in.*, 7 *1·4-in.*, 3 M. .	3	22·0	90	87
g.v.	Maya . . .	615	164	27	10	700	Yokosuka .	1886	1887	..	..	..	1 *8·2-in.*, 1 *4·7-in.*, 2 M. .	..	13·0	60	113
Scout	Mogami . . .	1329	316	31½	9¾	8000 turbines	Sasebo .	1907	1908	..	2½	..	2 *4·7-in.*, 4 *12-pr.* . .	2	23·0	..	..
cr.	Naniwa* . . .	3700	300	46	18½	7235	Elswick .	1885	1886	..	3	1½ shield	8 *6-in.*, 2 *3-pr.*, 10 M. . .	4	18·72 *t*	800	350

* Reported to have been removed from the active list.

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JAPAN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
cr.	Niitaka . . .	3365	235½	44	16½	10,000 Nic.	Yokosuka. .	1902	1905	..	2½	..	6 *6-in.*, 10 *3-in.*, 4 *2½-pr.* .	..	20·0	600	..
„	Otawa . . .	3000	341	42½	17	10,000 My.	Yokosuka . .	1903	1904	..	..	..	2 *6-in.*, 6 *4·7-in.*, 4 *12-pr.*, 2 M., 2 l.	..	20·0	600 875	..
t.g.b.	Shikinami . . (*ex* Gaidamak)	400	192½	24½	7½	3000	Abo, Finland .	1893	1894	..	..	..	2 *1·8-in.*, 7 *1·4 in.*, 10 M. .	3	22·0	90	87
cr.	Soya . . . (*ex* Varyag)	6500	420	52	20¾	20,000 My.	Philadelphia .	1899	1900	..	3	..	12 *6-in.*, 12 *12-pr.*, 6 *3-pr.* .	3 (sub.)	23·0	770 1250	571
„	Suma . . .	2657	306¾	40	16¼	8500	Yokosuka . .	1896	1898	237,000	2 shield	4½ 4 M.	2 *6-in.*, 6 *4·7-in.*, 12 *3-pr.*,	2	20·0	200	..
„	Sutsuya . . . (*ex* Novik)	3080	347	41½	16	18,000 My.	Danzig (Schichau)	1900	1902	..	2	..	2 *4·7-in.*, 8 other Q.F. and M.	2	25·0	600	..
„	Takao. . . .	1774	230	33	13	2330	Yokosuka . .	1888	1889	..	..	..	4 *6-in.*, 1 *4·7-in.*, 6 M. . .	..	15·0	300	255
„	Takachiho* . .	3700	300	46	18½	7500	Elswick . .	1885	1886	..	3	1½ shield	2 *10·2-in.* (A.), 6 *6-in.*, 2 *3-pr.*, 10 M.	4	18·7 *t*	800	365
t.g.b.	Tatsuta* . . .	875	240	27½	13	5500	Elswick . .	1894	1894	..	..	..	2 *4·7-in.*, 4 *3-pr.*. . . .	5	21·0	200	..
Scout	Tone	4035	400	48½	16¾	15,000 My.	Sasebo . .	1907	1908	..	2–3	..	2 *6-in.*, 10 *4·7-in.*, 2 *12-pr.* .	3	23·0	..	392
„	Tsugaru . . . (*ex* Pallada)	6630	413¼	55¾	21	11,610 My.	St. Petersburg (Galerny)	1899	1902	..	2½	..	8 *6-in.*, 20 *12-pr.*, 8 *1-pr.* .	4	20·0	900 1400	422
„	Tsukushi . . .	1350	210	32	15	2887	Elswick . .	1882	1893	..	..	..	2 *10-in.* (A.), 4 *4·7-in.*, 2 l., 4 M.	2	16·5 *t*	250	190
„	Tsushima . . .	3365	235½	44	16½	10,000 Nic.	Kure . .	1902	1904	..	2½	..	6 *6-in.*, 10 *3-in.*, 4 *2½-pr.* .	..	20·0	600	..
g.b.	Uji	620	180	27¾	10	1000 B.	Kure . .	1903	1905	..	..	..	4 *12-pr.*, *3* M. . . .	..	13·0	100	..
„	Yamato . . .	1476	206¾	36	15	1600	Yokosuka . .	1885	1886	..	..	..	2 *6·6-in.* (K.), 5 *4·7-in.*, 4 M.	2	13·0	..	242
Scout	Yodo	1230	300	32	9¾	6500	Sasebo . .	1908	1909	..	2½	..	2 *4·7-in.*, 4 *12-pr.* . .	2	22·0	..	..

Amakusa, mining vessel (*ex* Amur).

* Reported to have been removed from the active list.

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NETHERLANDS.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots	tons.	
c.d.s.t.	De Ruyter	5014	316½	51½	21¾	6377 *t.*	Amsterdam	1900	1904	347,500	6–4 H.N.S.	2	..	..	10 H.N.S.	3 H.S.	2 9·4-*in.*, 4 5·9-*in.*, 10 2·9-*in.*, 4 1·4-*in.*	3 2 sub.	16·5 *t*	680	444
„	Evertsen	3464	282¾	47	16¾	4735	Flushing	1894	1896	..	6–4 H.S.	2	..	..	9½ H.S.	3 H.S.	3 8·2-*in.*, 2 5·9-*in.*, 6 2·9-*in.*, 8 1·4-*in.*	3	16·0	280	268
„	Hertog Hendrik	5014	316¾	51½	21¾	6000 Y.	Amsterdam	1902	1903	347,500	6 H.N.S.	2	..	..	10 H.N.S.	3 H.S.	2 9·4-*in.*, 4 5·9-*in.*, 10 2·9-*in.*, 4 1·4-*in.*, 2 1.	3	16·5	680	444
t. & b.	Jacob van Heemskerck	5211	316¾	51½	21¾	6000 Y	Amsterdam	1906	1908	347,500	6–4 H.N.S.	2	..	..	10 H.N.S.	..	2 9·4-*in.*, 6 5·9-*in.*, 10 12-*pr.*, 4 1·4-*in.*, 2 1.	3 2 sub.	16·0	680	441
c.d.s.t.	Koningin Regentes	5014	316¾	51½	21¾	7290 Y.	Amsterdam	1900	1902	347,500	6–4 H.N.S.	2	..	..	10 H.N.S.	..	2 9·4-*in.*, 4 5·9-*in.*, 6 2·9-*in.*, 4 1·4-*in.*, 2 1.	3 2 sub.	16·5	680	444
t. & b.	Koningin Wilhelmina der Nederlanden . shd.	4527	327½	48¾	20	4600	Amsterdam	1892	1894	..	..	3	..	..	11	..	1 11-*in.*, 1 8·2-*in.*, 2 6·6 *in.*, 2 6·6-*in.*, 4 2·9-*in.*, 4 1·4-*in.*, 6 1·4-*in.*, 2 M.	4	16·5	448	293
c.d.s.t.	Kortenaer	3464	282¾	47	16¾	4400	Amsterdam	1894 1909	1896	..	6 H.S.	2	..	..	9½ H.S.	3 H.S.	3 8·2-*in.*, 2 5·9-*in.*, 6 2·9-*in.*, 8 1·4-*in.*	3	16·0	280	260
t. & b.	Marten Tromp	5211	316¾	51½	21¾	6377 *t*	Amsterdam	1904	1906	347,500	6–4 H.N.S.	2	..	..	10 H.N.S.	3 H.S.	2 9·4-*in.*, 4 5·9-*in.*, 10 2·9-*in.*, 4 1·4-*in.*	3 2 sub.	16·5 *t*	680	444
„	Piet-Hein	3464	282¾	47	16¾	4736 *t*	Rotterdam	1894	1896	..	6 H.S.	2	..	..	9½ H.S.	3 H.S.	3 8·2-*in.*, 2 5·9-*in.*, 6 2·9-*in.*, 8 1·4-*in.*	3	16·2 *t*	280	260
„	Reinier Claeszen	2440	229½	44¼	15	350	Amsterdam	1891	1892	..	4½–2 *comp.*	3	..	..	11 *comp.*	6 *comp. shield*	1 8·2-*in.* (*K.*), 1 6·6-*in.*, 1 2·9-*in.*, 4 1·9-*in.*, 3 1·4-*in.*	2	12·5 *t*	88	160
„	De Zeven Provincien	6525	339½	56	20¼	7500 Y.	Amsterdam	1909	..	..	6–4 K.S.	2	..	..	10 K.S.	..	2 11-*in.*, 4 5·9-*in.*, 10 12-*pr.*	..	16·0	700	440

Two coast-defence vessels of 850 tons and three monitors of 680 tons projected.

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NETHERLANDS.—Cruising Ships.

((I) denotes vessels of the Dutch Indian Navy.)

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	inches.	inches.			knots.	tons.	
g. v.	Assahan (I)	787	179	30¾	11½	1353	Rotterdam	1900	1900	..	..	..	3 *4·7-in.*, 2 *2·9-in.*, 4 *1·4-in.*	..	13·0	120	95
,,	Borneo (I) . . shd.	787	179½	31	13¼	1040	Glasgow	1892	1893	..	..	..	6 *4·1-in.*, 1 *2·9-in.*, 2 *1·4-in.*, 2 M.	..	13·0	124	106
,,	Edi (I) . . .	787	179½	30¾	11¾	1100	Flushing	1897	1898	..	..	..	3 *4·7-in.*, 2 *2·9-in.*, 4 *1·4-in.*	..	13·0	113	95
cr.	Friesland . .	3847	307	49	17¾	10,000 Y.	Rotterdam	1896	1898	285,700	2	..	2 *5·9-in.*, 6 *4·7-in.*, 4 *2·9-in.*, 8 *1·4-in.*, 4 smaller.	4	19·8 *t*	400	333
,,	Gelderland. . .	3969	310¾	49	17¾	10,000 Y.	Feijenoord	1898	1900	..	2¼	..	2 *5·9-in.*, 6 *4·7-in.*, 4 *2·9-in.*, 4 *1·4-in.*, 4 M.	4	20·0	850	333
,,	Holland . . .	3847	307	49	17¾	10,000 Y.	Amsterdam	1896	1898	285,700	2	..	2 *5·9-in.*, 6 *4·7-in.*, 4 *2·9-in.*, 8 *1·4-in.*, 4 M.	4	19·6 *t*	400	333
,,	Koetei (I) . . .	778	179	30¾	11½	1412	Amsterdam	1898	1899	..	..	..	3 *4·7-in.*, 2 *2·9-in.*, 4 *1·4-in.*	..	13·0	120	97
,,	Lombok (I) . . shd.	591	176	27¼	11	990	Amsterdam	1891	1892	..	..	..	3 *4·7-in.*, 1 *2·9-in.*, 2 *3-pr.*	..	12·0	55	84
,,	Mataram (I) . .	797	179½	30¾	11¾	1100	Amsterdam	1896	1897	..	..	..	3 *4·7-in.*, 2 *3-in.*, 2 *1·4-in.*	..	13·0	113	95
cr.	Noord-Brabant . .	3969	310¾	49	17¾	10,000 Y.	Flushing	1899	1901	..	2¼	..	2 *5·9-in.*, 6 *4·7-in.*, 4 *2·9-in.*, 4 *1·4-in.*, 4 M.	4	20·0	850	333
,,	Serdang (I) . .	797	179½	30¾	11¾	1100	Flushing	1897	1898	..	..	..	3 *4·7-in.*, 2 *2·9-in.*, 4 *1·4-in.*	..	13·0	113	95
g.v.	Siboga (I) . .	778	179	30¾	11½	1395	Amsterdam	1898	1899	..	..	..	3 *4·7-in.*, 2 *2·9-in.*, 4 *1·4-in.*	..	13·0	120	95
cr.	Sumatra (I) . .	1693	229½	37	14	3750	Amsterdam	1890	1892	..	1½	..	1 *8·2-in.*, 1 *5·9-in.*, 2 *4·7-in.*, 1 *2·9-in.*, 4 *3-pr.*, 2 M.	..	17·0	225	183
g.v.	Sumbawa (I) . .	591	176	26½	11¼	930	Flushing	1891	1892	..	..	..	3 *4·7-in.*, 1 *2·9-in.*, 2 *3-pr.*	..	12·5 *t*	60	84
cr.	Utrecht . . .	3969	310¾	49	17¾	10,000	Amsterdam	1898	1900	..	2¼	..	2 *5·9-in.*, 6 *4·7-in.*, 4 *2·9-in.*, 4 *1·4-in.*, 4 M.	4	20·0	850	333
,,	Zeeland . . .	3847	307	49	17¾	10,589 Y. *t*	Flushing	1897	1898	285,700	2	..	2 *5·9-in.*, 6 *4·7-in.*, 4 *2·9-in.*, 8 *1·4-in.*, 4 M.	4	19·4 *t*	400	333

Gun-vessels of the Indian Navy: Arend, Flamingo, Raaf, Reiger, Zeeduif, Zwaan, Pelikaan, Condor, Zeemeeuuw, Zwaluw (400 tons), launched between 1880 and 1891; Java (1279 tons), 1885; Ceram and Flores (541 tons), 1887: Glatik (417 tons), 1894; Havik, Snip, Sperwer, Kwartel, Favant, and Valk between 1894 and 1903; Argus and Cycloop (438 tons), 1893. Hydrograaf, surveying ship, in hand.

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NORWAY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position.		Guns.	Torpedo Tubes.			
															Heavy Guns.	Secondary.					
		tons.	ft.	ft.	ft.					£	in.	in.			in.	in.			knots.	tons.	
c.d.s.	Eidsvold . . Norge . .	3847	290	50½	16½	4500 Y.	Elswick	1900	1901	350,000	6 H.N.S.	2	..	..	6 H.N.S.	6 H.N.S.	2 *8·2-in.*, 6 *5·9-in.*, 8 *12-pr.*, 6 *3-pr.*	2 sub.	16·5 *t*	400 600	261
„	Harald Haarfagre . .	3556	280	48½	16½	3700	Elswick	1896	1898	300,000	7 H.S.	2	..	..	8 H.S.	..	2 *8-in.*, 6 *4·7-in.*, 6 *12-pr.*, 6 *1½-pr.*	2 sub.	17·2 *t*	200 500	248
„	Torkenskjold							1897	1899												

Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
g.b.	Æger . .	387	108½	29½	8	450	Horten .	1892	1893	..	1½	..	1 *8·2-in.*, 1 *2·7-in.*, 2 *1·9-in.* . .	..	9·0	..	43
g.v.	Ellida . .	984	187	32¾	14½	900	Horten .	1880	1881	..	..	..	5 *5·9-in. 4-ton* (K.), 1 *4·7-in.*, 1 l., 2 M. .	1	12·0	97	128
„	Frithjof . .	1349	216½	32¾	13½	300	Horten .	1896	1898	..	..	..	2 *4·7-in.*, 4 *2·9-in.*, 4 *1·4-in.*, 2 l. . .	3 sub.	15·0	120	156
„	Heimdal . .	620	167½	26¾	11¾	700	Christiania .	1892	1893	..	..	..	4 *2·5-in.*	..	12·0	92	62
g.v.	Viking . .	1095	203½	30½	13	2000	Horten .	1891	1892	..	1½	..	2 *5·9-in.* (A.), 4 *2·5-in.*, 4 *1·4-in.*, 2 M. .	3	15·0	140	156

Eleven Gunboats, of 189 to 280 tons, and of 180 to 450 I.H.P., armed with one large gun and machine guns in each.

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PORTUGAL.—Armoured Ship.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots	tons.	
b.	**Vasco da Gama** .	2972	233	40	18½	6000 W.T.	Blackwall . Leghorn	1876	1878 1903	132,000	9¾–4	3	6 K.S.	..	7¾ K.S.	..	2 *8-in.*, 4 *4·7-in.*, 2 *2·5-in.*, 2 *1-pr.*, 4 M.	2 (sub.)	15·5 *t*	300	218

Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Normal Coal Supply.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
cr. . .	**Adamastor** .	1962	250	35	14	4000	Leghorn .	1896	1897	..	3	5	2 *5·9-in.*, 4 *4·7-in.*, 4 *2·2-in.*, 4 M.	3	18·0 *t*	270	232
cr. . .	**Dom Carlos I.** .	4100	360	46½	17½	12,500 Y.	Elswick .	1898	1899	..	4	..	4 *5·9-in.* (A.), 8 *4·7-in.*, 12 *3-pr.*, 6 *1-pr.*, 4 M.	5 (3 sub.)	22·0	1000	260
g.v. . .	**Dom Luiz I.** .	710	151	27¼	13¾	512	Lisbon . .	1895	1896	..	..	..	4 *4·1-in.*, 3 *2·5-in.*, 3 M. .	..	9·9	100	120
g.v. . .	**Patria** . .	620	196¾	27½	8½	1800	Lisbon . .	1903	1905	..	..	..	4 *4-in.*, 6 *1·8-in.* . .	..	15·0	..	..
cr . .	**Rainha Amelia**	1640	246	36	14¾	5000 Nor.	Lisbon . .	1899	1901	..	1	..	4 *5·9-in.*, 2 *3·9-in.*, 2 *3-pr.*, 4 M.	2	20·6 *t*	..	250
„ . .	São Gabriel / São Rafael	1772	246	35½	14¼	4000 N.S.	Havre . .	1898	1899	..	1½	..	2 *5·9-in.* (*Canet*), 4 *4·7-in.*, 8 *1·8-in.*, 2 M.	1	17·5 *t*	500	200

About 20 small gunboats, including two gunboats of 220 tons, the Al. Baptista de Andrade and Thomaz Andrea, for Mozambique and Timor, 29 river-gunboats.
Mine-layer, Vulcano, 110 ft. long, 19 ft. 6 in. beam, 400 I.H.P., 12 knots, launched by Thornycroft, 1909.

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RUSSIA.—Armoured Ships.

(B.S., Black Sea Fleet.)

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Normal Coal Supply.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkheads.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns. B.L.R. are of Russian Krupp pattern.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	**Admiral Makaroff** .	7900	443	75¾	23	16,500 B.	La Seyne .	1906	1907		6¾–4 K.S.	2	3 K.S.	6¾ K.S.	5¾ K.S.	3 K.S.	2 *8-in.*, 8 *6-in.*, 20 *12-pr.*, 4 *6-pr.*	2 sub.	22·5 *t*	750 / 1020	573
b.	**Alexander II** . shd.	9244	326	67	23	8000	St. Petersburg.	1887	1890	..	14–6 *comp.*	2½	..	6 *comp.*	10 *comp.*	6 *comp.*	2 *12-in.*, 4 *9-in.*, 8 *6-in.*, 4 *6-pr.*, 4 *3-pr.*, 6 M.	5	16·5 *t*	1200	604
b.	**Andrei Pervozvannyi**	17,200	429½	79¾	28½	17,600 B.	St. Petersburg. (Galerny)	1906	..	1,170,000	11–6 K.S.	2½	5 K.S.	..	12 K.S.	7 K.S.	4 *12-in.*, 14 *8-in.*, 20 *4·7-in.*, 14 smaller	5 4 sub.	18·0	1500	933
a..c	**Bayan** . . .	7900	443	75¾	23	16,500 B.	St. Petersburg (New Admiralty)	1907	..	..	6¾–4 K.S.	2	3 K.S.	6¾ K.S.	5¾ K.S.	3 K.S.	2 *8-in.*, 8 *6-in.*, 20 *12-pr.*, 4 *6-pr.*	5 sub.	21·0	750 / 1020	573
b.	**Cesarevitch** . .	12,912	388¾	76¼	26½	16,300 B.	La Seyne .	1901	1902	..	9¾–4 K.S.	2½	6 K.S.	9 K.S.	10–11 K.S.	6¾ K.S.	4 *12-in.*, 12 *6-in.*, 20 *3-in.*, 20 *1·8-in.*, 6 *1·4-in.* 4 M., 2 l.	2 sub.	19·6 *t*	900 / 1350	732
t.	**Dvenadzat Apostoloff** (Twelve Apostles), B.S.	8433	330	60	26	11,500	Nicolaieff .	1890	1892	..	14–6 *comp.*	2½	10 *comp.*	12 *comp.*	12 *comp.*	5 *comp.*	4 *12-in.*, 4 *6-in.*, 8 *3-pr.*, 10 M.	6	16·6 *t*	800	500
b.	**Evstafi, B.S.** . .	12,733	372¼	72¾	27	10,600 B.	Nicolaieff .	1906	..	..	9–3 K.S.	2½	6 K.S.	7–5 K.S.	10 K.S.	5 K.S.	4 *12-in.*, 4 *8-in.*, 12 *6-in.*, 14 *3-in.*, 8 *1·8-in.*, 2 *1·4-in.*, 6 M., 2 l.	5	16	670 / 1400	731
b.	**Gangut*** . . .	23,000	590½	87	27¼	42,000 Y. tur.	St. Petersburg (New Admiralty)	Bldg.	..	..	..	...	..	..	..	..	12 *12-in.*, 16 *4·7-in.*, 4 *3-pr.*, 8 M.	4 sub.	23	1200 / 3000	..
b.	**Georgi Pobiedonosetz** B.S.	10,280	320	69	26½	10,600 / 13,468 *t*	Sebastopol .	1892	1896	†431,000	16–11	..	12	..	12	..	6 *12-in.*, 7 *6-in.*, 8 *3·9-in.*, 6 M.	7	16·5 *t*	700	500
a.c.	**Gromoboi** . . shd.	12,336	473	68½	26	14,500	St. Petersburg (Baltic)	1899	1900	..	6 H.S.	3	4¾ H.S.	6 H.S.	6 H.S.	4¾ H.S.	4 *8-in.*, 16 *6-in.*, 20 *3-in.*, 20 small Q.F. and M.	4 4 sub.	20·0	2500	814
a.g.b.	**Grozjastchy** . .	1492	229	41¾	11	2000 B.	St. Petersburg	1890	1891	..	5	1½	..	3½	..	..	1 *9-in.*, 1 *6-in.*, 8 Q.F.	2	15·0	100	120

* Particulars uncertain.

† Exclusive of armament.

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RUSSIA.—Armoured Ships—*continued.*

(B.S., Black Sea Fleet.)

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Normal Coal Supply.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkheads.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns. B.D.K. are of Russian Krupp pattern.	Torpedo Tubes.			
		tons.	ft	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	**Ioann Zlatoust**, B.S.	12,733	372½	72¾	27	10,600 B.	Sebastopol	1906	..	..	9–3 K.S.	2½	6 K.S.	7–5 K.S.	12–10 K.S.	5 K.S.	4 *12-in.*, 4 *8-in.*, 12 *6-in.*, 14 *3-in.*, 8 *1·8-in.*, 2 *1·4-in.*, 6 M., 2 l.	5	16·0	670† 1400	636
a.g.b.	**Khrabry** . . .	1735	229	41¾	11	3000 Nic.	St. Petersburg (New Admiralty)	1895	1896	..	5	1½	..	3½	..	..	2 *8-in.*, 8 Q.F. . . .	2	15·0	100	120
a.c.	**Pallada** . . .	7900	443	75¾	23	16,500 B.	St. Petersburg (New Admiralty)	1906	..	..	6¾–4 K.S.	2	3 K.S.	6¾ K.S.	5¾ K.S.	3 K.S.	2 *8-in.*, 8 *6-in.*, 20 *12-pr.*, 4 *6-pr.*	5 sub.	21·0	750 1020	573
2nd cl. *cr.*	**Pamyat Azova** shd. .	6734	377	51	23	8000 B.	St. Petersburg	1888	1890	350,000	9 comp.	2½	..	8 comp.	8 comp.	..	2 *8-in.*, 13 *6-in.*, 14 Q.F., and 3 M.	3	18·8 t	1000	525
b.	**Panteleimon**, B.S. (*ex* Potemkine)	12,480	372½	72¾	27	10,600 B.	Nicolaieff .	1900	1902	..	9–3 K.S.	2½	6 K.S.	7–5 K.S.	12–10 K.S.	5 K.S.	4 *12-in.*, 16 *6-in.*, 14 *3-in.*, 6 *1·8-in.*, 14 *1·4-in.*, 6 M., 2 l.	5 sub.	17·0	670†	636
b.	**Pavel I** (Imperator) .	17,200	429¾	79¾	28½	17,600 B.	St. Petersburg (Baltic)	1907	..	1,170,000	11–6 K.S.	2½	5 K.S.	..	12 K.S.	7 K.S.	4 *12-in.*, 14 *8-in.*, 20 *4·7-in.*, 14 smaller.	5 4 sub.	18·0	1500	933
b.	**Petropavlovsk.***	23,000	590½	87	27¼	42,000 Y. tur.	St. Petersburg (Baltic)	Bldg.	..	2,800,000	..	..	..	..	..	...	12 *12-in.*, 16 *4·7-in.*, 4 *3-pr.*, 8 M.	4 sub.	23·0	1200 3000	...
b.	**Poltava*** . .						St. Petersburg (New Admiralty)	Bldg.	..	2,800,000											
a.c.	**Rossia** . . shd.	12,130	480	68½	26	14,500 B.	St. Petersburg	1896	1898	..	10–5 H.S.	2½	4 H.S.	6 H.S.	2 H.S.	2 H.S.	4 *8-in.*, 16 *6-in.*, 12 *3-in.*, 20 small Q.F. & M.	5	20·0	2500 §	725
b.	**Rostislav**, B.S. . .	8880	341	66½	24	8500	Nicolaieff .	1896	1899	..	15¾–8 H.S.	2–3	5 H.S.	5 H.S.	15¾ H.S.	6 H.S.	4 *10-in.*, 8 *5·9-in.* (Canet), 12 *12·8-in.*, 4 *1·5-in.*, 2 M.	6	16·0	§550 800	624
a.c.	**Rurik** . . .	15,170	490	75	26	19,700 B.	Barrow . .	1906	1907	..	6–3 K.S.	1½	3 K.S.	3 K.S.	8 K.S.	7 K.S.	4 *10-in.*, 8 *8-in.*, 20 *4·7-in.*, 12 smaller.	2 sub.	21·0	1200 2000	800
b.	**Sevastopol*** . .	23,000	590½	87	27¼	42,000 Y. tur.	St. Petersburg (Baltic)	Bldg.	..	2,800,000	..	..	..	..	..	..	12 *12-in.*, 16 *4·7-in.*, 4 *3-pr.*, 8 M.	4 sub.	23·0	1200 3000	...
b.	**Sinope**, B.S. . .	10,180	331	69	26½	13,000 B.	Sebastopol .	1887	1890	900,000	16–11 comp.	3	14 comp.	12	14 comp.	..	6 *12-in.*, 7 *6-in.*, 8 Q.F., 6 M.	7	16·75	886	325
b.	**Slava** . . .	13,516	367½	76	26	16,000 B.	St. Petersburg (Baltic)	1903	1906	..	9–4 K. S.	4	6 K.S.	9 K.S.	10 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 20 *3-in.*, 20 *3-pr.*, 6 *1-pr.*	2 sub.	18·0	1250 2000	740
b.	**Tria Sviatitelia**, B.S.	13,318	357½	72¼	27	10,600	Nicolaieff .	1893	1896	..	16 H.S.	3	16 H.S.	12 H.S.	16 H.S.	5 H.S.	4 *12-in.*, 8 *6-in.*, 4 *4·7-in.*, 50 smaller Q.F. & M.	6 2 sub.	18·0 t	1000	582

* Particulars uncertain. † And liquid fuel, 580 tons. § And liquid fuel.

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RUSSIA.—Cruising Ships, &c.

(B.S., Black Sea Fleet.)

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	ins.				knots.	tons.	
to.g.b. .	**Abrek** . . .	535	212¼	24¾	9	4506 *t*	Abo . .	1896	1897	53,600	½	..	2 *3-in.*, 4 *1·8-in.* . .	2	21·2 *t*	..	..
2nd cl. *cr.* .	**Admiral Korniloff**	5800	351	48½	20	9000	St. Nazaire .	1887 1895	1889	296,000	2½	..	10 *6-in.*, 6 *1·8-in.*, 6 *1·4-in.*, 5 l.	5	17·5 *t*	1100	425
3rd cl. *cr.* .	**Almas** . . .	3285	325	43½	17½	7500 B.	St. Petersburg (Baltic)	1903	1903	..	2¾	5–3½ K.S.	6 *4·7-in.*, 8 *1·8-in.*, 2 *1·4-in.*, 3 M.	6	19·0 *t*	560	340
2nd cl. *cr.* .	**Askold** . . .	5905	426½	49¼	20¾	24,000 T.S.	Kiel . . (Germania)	1900	1901	..	3	4	12 *6-in.*, 12 *3-in.*, 8 *1·8-in.*, 2 *1·4-in.*, 2 M.	6 (2 sub.)	23·8 *t*	720 1100	500
2nd cl. *cr.* .	**Aurora** . . .	6731	413¼	55¾	21	11,610 B.	St. Petersburg (Galerny)	1900	1902	..	2½	..	8 *6-in.*, 20 *3-in.*, 8 *1·4-in.*	3	20·0	900 1400	422
g.b. . .	**Bobr** . . .	875	215¼	35¾	9	800	St. Petersburg (New Admiralty)	1907	1908	..	..	..	2 *4·7-in.*, 4 *12-pr.*, 3 M. .	1	12·0	60	170
2nd cl. *cr.* .	**Bogatyr** . . .	6645	416¾	54½	20¾	20,300 Nor.	Stettin . . (Vulcan)	1901	1902	..	2	5 N.S.	12 *6-in.*, 12 *3-in.*, 6 *1·8-in.*, 2 *1·4-in.*, 2 M.	4 (2 sub.)	24·0 *t*	720 1100	580
to.g.b. .	**Captain Sacken**, B.S.	742	210	24	8¾	3400	Nicolaieff .	1888	1889	40,700	..	..	7 *4·7-in.*, 7 M. . .	3	18·5 *t*	97	120
2nd cl. *cr.* .	**Diana** . . .	6630	418¼	55¾	21	11,610 B.	St. Petersburg (Galerny)	1899	1902	..	2½	..	10 *6-in.*, 20 *3-in.*, 8 *1·4-in.*	3	20·0	900 1400	422
g.v. .	**Donetz**, B.S. . .	1224	210	35	11	1500 B.	Nicolaieff .	1887	1888	40,000	..	..	2 *8-in.*, 1 *6-in.*, 7 Q.F. & M.	2	13·5 *t*	250	161
g.b. . .	**Gilyak** . . .	875	215¼	35¾	9	800	St. Petersburg (New Admiralty)	1906	1908	..	..	..	2 *4·7-in.*, 4 *12-pr.*, 3 M. .	1	12·0	60	170
to.g.b.. .	**Griden**, B.S. . .	400	192½	24¼	7½	3500	Nicolaieff .	1893	1894	66,600	..	..	2 *1·8-in.*, 7 *1·4-in.*, 10 M.	2	22·0	90	60
3rd cl. *cr.* .	**Jemchug** . . .	3106	347¾	41½	16	17,000 Y.	St. Petersburg (Nevsky)	1903	1904	..	2	..	8 *4·7-in.*, 6 *1·8-in.*, 2 *1·4-in.*, 1 M.	3	23·0	600	340
2nd cl. *cr.* .	**Kagul**, B.S. (ex-Otchakoff)	6645	439	54½	20½	19,500 Nor.	Sebastopol .	1902	1905	..	2¾	5–3½ K.S.	12 *6-in.*, 12 *3-in.*, 6 M. .	2 sub.	23·0	720 1100	570
to.g.b. .	**Kazarsky**, B.S. . .	400	190	24	8½	3500	Elbing . .	1890	1891	32,500	..	..	9 *1·8-in.* (Hotchkiss) .	2	23·0	90	60
g.b. . .	**Khivinetz** . .	1340	230	36	10½	1400 B.	St. Petersburg (New Admiralty)	1904	1905	..	..	..	2 *8-in.*, 8 *3-in.*, 4 M. .	..	13·0	218	200

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RUSSIA.—Cruising Ships, &c.—*continued.*

(B.S., Black Sea Fleet.)

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	ins.				knots.	tons.	
g.b.	**Koreiets**	875	215¼	35¾	9	800	St. Petersburg (New Admiralty)	1906	1908	..	..	..	2 *4·7-in.*, 4 *12-pr.*, 3 M.	1	12·0	60	170
g.v.	**Kubanets, B.S.**	1224	210	35	11	1500 B.	Sebastopol	1888	1889	40,000	..	..	2 *8-in.*, 1 *6-in.*, 7 Q.F.	2	13·8 *t*	250	161
to.g.b.	**Lieutenant Ilyin**	714	230	24	8¾	3500	St. Petersburg	1887	1888	40,150	..	..	7 *3-pr.*, 10 M.	5	20·1 *t*	97	120
2nd cl. *cr.*	**Oleg**	6675	439¾	54½	20½	19,500 Nor.	St. Petersburg (New Admiralty)	1903	1904	..	2¾	5–3½	12 *6-in.*, 12 *3-in.*, 6 *1·8-in.*	2 sub.	23·0	600	340
2nd cl. *cr.*	**Pamyat Mercuria,** B.S. (ex-Kagul)	6645	439	54½	20½	19,500	Nicolaieff	1903	1907	..	2¾	5–3½ K.S.	4 *8-in.*, 6 *6-in.*, 12 *3-in.*, 6 *1·8-in.*	2 (2 sub.)	23·0	720	..
to.g.b.	**Posadnik**	394	192½	24¼	7½	3600	Elbing	1892	1894	111,000	..	..	2 *1·8-in.*, 7 *1·4-in.*, 3 M.	2	22·0	90	87
3rd cl. *cr.*	**Rynda**	3508	265¾	46	16	3000	St. Petersburg	1885	1887	..	1½	..	4 *6-in.*, 9 Q.F., M., & 4 l.	1	14·8 *t*	710	322
g.b.	**Sivoutch**	875	215¼	35¾	9	800	St. Petersburg. (New Admiralty)	1906	1908	..	..	..	2 *4·7-in.*, 4 *12-pr.*, 3 M.	..	12·0	60	170
corv.	**Strjelok**	1343	206¾	32¾	14	1528	St. Petersburg.	1880	1881	..	..	..	3 *6-in.*, 7 Q.F., M., & 4 l.	..	13·0	250	172
g.v.	**Teretz, B.S.**	1224	210	35	11	1500 B.	Sebastopol	1888	1889	40,000	..	..	2 *8-in.*, 1 *6-in.*, 7 Q.F. & M.	2	13·8 *t*	250	161
„	**Uraletz, B.S.**	1224	210	35	11	1500 B.	Sebastopol	1888	1890	40,000	..	..	2 *8-in.*, 1 *6-in.*, 7 Q.F. & M.	2	13·8 *t*	250	161
cr.	**Vitiaz**	6375	414	52½	20¾	20,000 B.	St. Petersburg (Galerny)	Bldg.	..	..	2¾	5–3½ K.S.	12 *6-in.*, 12 *3-in.*, 8 *1·8-in.*	5 (2 sub.)	23·0	720	..
to.g.b.	**Voevoda**	415	192½	24¼	7½	3600	Elbing	1892	1893	111,000	..	..	2 *1·8-in.*, 7 *1·4-in.*, 3 M.	2	22·0	90	87
g.v.	**Zaporojets**	1224	210	35	10	1500	Nicolaieff	1887	1889	40,000	..	..	2 *8-in.*, 1 *6-in.*, 7 Q.F. & M.	2	13·5 *t*	250	161

Okean, *coal transport*, 12,000 tons, 18 knots, launched at Kiel, 1901. Torpedo transports and mining vessels Volga, Bakan, Yenessei and Amur
Eight river gunboats (946 tons) for the Amur are in hand. Gunboats for the Caspian, Kars and Ardagan, launched 1909.

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RUSSIA.—Auxiliary Steamers.

NAME.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-Power.	Date of Launch.	Speed.
VOLUNTEER FLEET.	tons.	ft. in.	ft. in.	ft. in.				knots.
Petersburg	9252				2		1894	19
Don (*ex* Fürst Bismarck)	8430				2	16,410	1890	19
Kiev	10,500	440 0	49 6	24 0	2	3200	1895	13
Kuban (*ex* Auguste Victoria)	8480				2	12,000	1889	18½
Lena (*ex* Kherson)	10,225				2	13,100	1898	19½
Nijni Novgorod	7876	325 0	40 0	23 6	1	2000	1891	11½
Smolensk	11,850				2		1901	20
Saratoff	8556	462 0	50 0	24 0	2	10,000	1892	19
Tamboff	8640	385 0	45 0	24 6	1	2,500	1893	12¾
Terek (*ex* Columbia)	7241				2	13,680	1889	18½
Vladimir	10,500	440 0	49 6	24 0	2	3,200	1895	12
Voronej	10,500	440 0	49 6	24 0	2	3,200	1895	12
Yaroslav	8640	385 0	45 0	24 6	1	2,500	1893	12¾

The vessels of the Black Sea Shipping Company are available for transport purposes.

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SPAIN.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	Alfonso XIII.	15,460	435	78¾	25½	15,300Y. P. tur.	Ferrol	Bldg.	..	..	9–4 K.S.	2–1	6–5 K.S.	6–3 K.S.	10 K.S.	6 K.	8 *12-in.*, 20 *4-in.*, 2 *3*-pr., 2 l., 2 M.	..	19·5	800 1900	700
a.c.	Cataluña	6889	347¾	61	21¾	15,000	Cartagena	1900	..	600,000	12–10	2	..	12	10½	..	2 *11-in.*, 10 *5·5-in.*, 2 *2·7-in.*, 4 *2·2-in.*, 4 *1·4-in.*, 2 M.	5 sub.	20·0	1200	484
„	Emperador Carlos V	9089	380	67	25	18,500	Cadiz (Vea Murguia)	1895	1898	734,000	2	6½–2	2	..	10	2	2 *11-in.* (Hontoria), 8 *5·5-in.*, 4 *3·9-in.*, 2 *2·7-in.*, 4 *2·2-in.*, 6 M.	6	20·0	1200	535
b.	España	15,460	435	78¾	25½	15,300Y. P. tur.	Ferrol	Bldg.	..	..	9–4 K.S.	2–1	6–5 K.S.	6–3 K.S.	10 K.S.	6 K.	8 *12-in.*, 20 *4-in.*, 2 *3*-pr., 2 l., 2 M.	..	19·5	800 1900	700
b.	Jaime I.																				
b.	Pelayo	9744	330	66	25	9000 Nic.	La Seyne	1887	1890 1897	..	17¾	4	..	..	19¼	4 H.S.	2 *12·5-in.*, 2 *11-in.*, 9 *5·5-in.*, 6 smaller, 12 M.	7	16·0	800	600
a.c.	Princesa de Asturias	6889	347¾	61	21¾	15,000	Carraca	1896	..	600,000	12–10	2	..	12	10½	..	2 *11-in.*, 10 *5·5-in.*, 2 *2·7-in.*, 4 *2·2-in.*, 4 *1·4-in.*, 2 M.	5	20·0	1200	500

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SPAIN.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	ins.				knots.	tons.	
g.b.	Bonifaz	800	200	30	..	1100 Y	Cartagena	Pro.	..	..	..	..	4 *3-in.*, 2 M.	..	13·0	..	..
to.g.b.	Don Alvaro de Bazán	810	233	26¾	22	2500	Ferrol	1897	1899	..	..	..	2 *4·7-in.* (Hontoria), 4 *1·6-in.*, 2 M.	4	19·0	..	110
,,	Doña María de Molina	810	233	26¾	22	2500	Ferrol	1896	1898								
cr.	Extremadura	2030	290	36	14	7000 T	Cadiz	1900	1902	..	2	..	8 *4-in.* (Vickers), 4 *2·2-in.*, 2 *1·4-in.*, 1 l.	..	20·0	430	246
g.b.	Lauria	800	200	30	..	1100 Y	Cartagena	Pro.	..	..	..	..	4 *3-in.*, 2 M.	..	13·0	..	..
,,	Laya							Bldg.	..								
cr.	Lepanto	4750	318½	50½	20	12,000	Cartagena	1892	1895	..	4¾	..	4 *7·8-in.* (Hontoria), 6 *4·7-in.*, 6 *6-pr.*, 4 *3-pr.*, 5 M.	5	20·0	1100	276
to.g.b.	Marqués de la Victoria	810	233	26¾	22	2500	Ferrol	1897	1900	..	..	..	2 *4·7-in.* (Hontoria), 4 *1·6-in.*, 2 M.	4	19·0	..	110
g.v.	Marqués de Molíns	562	190	23	10¼	2600	Ferrol	1891	1893	..	..	..	2 *4·7-in.* (Hontoria), 4 *2·2-in.*, 1 M.	2	12·0	106	80
,,	Martin Alonso Pinzón							1892	1893								
g.b.	Recalde	800	200	30	..	1100 Y	Cartagena	Bldg.	..	..	..	..	4 *3-in.*, 2 M.	..	13·0	..	..
cr.	Reina Regente	5287	337	529	19¾	6500 W.T.	Ferrol	1906	1908	..	..	3	10 *5·5-in.*, 12 *2·2-in.*, 2 l., 8 M.	3	20·0	1200	497
,,	Rio de la Plata shd.	1773	246	35¼	15	7100 N.S.	Havre	1898	1899	..	..	1	2 *5·5-in.*, 4 *3 9-in.*, 4 *2·2-in.*, 6 M.	2	20·0	270	213
g.v.	Vincente Yáñez Pinzón	562	190	23	10¼	2600	Ferrol	1891	1892	..	..	..	2 *4·7-in.* (Hontoria), 4 *2·2-in.*, 1 M.	2	12·0	106	80

Hernán Cortés, Vasco Nuñez de Balboa, Ponce de Léon, MacMahon, Perla, Destructor, Nueva España and Temerario, gunboats.

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SWEDEN.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
c.d.s., t.	**Aeran** . .	3612	287	49¼	16½	6500 Y.	Gothenburg	1901	1902	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 2 *1·4-in.*, 2 M.	2 sub.	17·2 *t*	370	**250**
„	**Dristigheten** .	3445	285	48½	16	5400 Y	Gothenburg	1900	1901	..	8 K.S.	1⅞	..	..	8 N.S.	3¾ K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 2 M.	2 sub.	16·5	300	**250**
a.c.	**Fylgia** . .	4100	377¼	48¾	16	12,440 Y. *t*	Stockholm .	1905	1907	385,700	4 K.S.	2	..	..	5 K.S.	..	8 *5·9-in.*, 14 *2·2-in.*, 3 *1·4-in.* .	2	22·5 *t*	350 / 900	**321**
c.d.s., t.	**Göta** . .	3238	258½	48	16¾	4750	Gothenburg	1890 1902	1891	..	11¾–8	2	..	..	7½ H.S.	5 H.S.	1 *8·2-in.*, 7 *5·9-in.*, 11 *2·2-in.*, 2 *1·4-in.*	3	16·0	240	**150**
„	**Manligheten** .	3612	287	49¼	16½	7400 Y.	Malmö .	1904	1906	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *2 2-in.*, 2 *1·4-in.*, 2 M.	2 sub.	17·0	370	**250**
„	**Njord** . .	3445	278¼	48½	17½	5350	Gothenburg	1898	1899	..	9½ H.N.S.	1⅞	..	..	9⅞ H.N.S.	4 H.N.S.	2 *9·8-in.*, 6 *4·7-in.*, 10 *2·2-in.*, 4 M.	1	16·5	275	**200**
„	**Oden** . .	3445	278¼	48½	17½	5330	Stockholm .	1896	1898	..	9½ H.N.S.	1⅞	..	..	9⅞ H.N.S.	4 H.N.S.	2 *9·8-in.*, 4 *4·7-in.*, 10 *2·2-in.*, 4 M.	1	16·5	275	**200**
„	**Oscar II** . .	4203	313¾	49½	16¾	8500 Y.	Gothenburg	1905	1907	..	6 K.S.	2	6 K.S.	6 K.S.	7½ K.S.	5 K.S.	2 *8·2-in.*, 8 *5·9-in.*, 10 *2·2-in.*, 2 *1·4-in.*, 2 M.	2 sub.	18·0	350 / 500	**326**
„	**Svea** . .	3051	248¼	49¼	17	3640	Gothenburg	1886 1904	1887	..	11¾–8	2	..	..	7½ H.S.	5 H.S.	1 *8·2-in.*, 7 *5·9-in.*, 11 *2·2-in.*, 2 *1·4-in.*	1	14·7 *t*	220	**268**
„	**Tapperheten** .	3612	287¼	49¼	16½	6000 Y.	Malmö .	1901	1904	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 2 *1·4-in.*, 2 M.	2 sub.	16·5	370	**250**
„	**Thor** . .	3445	278¼	48½	17½	5350	Stockholm .	1898	1890	..	9½ H.N.S.	1⅞	..	..	9⅞ H.N.S.	3¾ H.N.S.	2 *9·8-in.*, 6 *4·7-in.*, 10 *2·2-in.*, 4 M.	1	16·5	275	**200**
„	**Thule** . .	3248	260¾	48	16¾	4740	Stockholm .	1892 1904	1894	..	11¾–8	1⅞	..	..	7½ H.S.	5 H.S.	1 *8·2-in.*, 7 *5·9-in.*, 11 *2·2-in.*, 2 *1·4-in.*	2	16·2 *t*	250	**165**
„	**Wasa** . .	3612	287	49¼	16½	6000 Y.	Stockholm .	1901	1893	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 2 *1·4-in.*, 2 M.	2 sub.	16·5	370	**250**
„	**Unnamed** . .	6800	..	..	21½	17,500 Y.	..	Pro.	..	..	8	..	..	..	..	..	4 *11-in.*, 4 *7·6-in.*, 11 *4·2-in.*, 4 *1-pr.*	2 sub.	22·0	800	**450**

The old coast-defence ships John Ericsson, Thordön, and Tirfing, 1500 tons, Loke, 1600 tons, and the armoured gunboats Berserk, Björn, Folke, Gerda, Hildur, Sölve and Ulf, 460 tons. Some of these are being partially modernized.

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SWEDEN.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.										knots.	tons.	
to.g.b.	Claes Horn	787	222	27	10¼	3600	Stockholm	1899	1900	..	..	..	2 *4·7-in.*, 4 *2·2-in.*	1 sub.	20·0	..	100
„	Claes Uggla	787	232	27¼	8¾	4500 Y.	Stockholm	1900	1901	..	..	..	2 *4·7-in.*, 4 *2·2-in.*	1	20·5	..	100
g.v.	Edda	549	183¾	27	10¼	960	Carlskrona	1885	1886	..	..	..	1 *10·6-in.*, 1 *6-in.*, 2 *1·5-in.*, 2 M.	..	13·6 *t*	80	76
to.g.b.	Jacob Bagge	787	222	27	10¼	3970	Malmö	1898	1899	..	..	..	2 *4·7-in.*, 4 *2·2-in.*	1 sub.	19·5	..	100
	Örnen					4100	Gothenburg	1896	1897						19·5		
„	Psilander	787	232	27¼	8¾	4500 Y.	Stockholm	1900	1901	..	..	..	2 *4·7-in.*, 4 *2·2-in.*	1 sub.	20·5 *t*	..	100

Four gunboats of 190 to 200 tons, and about 130 I.H.P. each, and carrying 1 5-in. B.L.R. and 2 M.

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TURKEY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draugh	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.						in.	in.	in.	in.	in.	in.			knots.	tons.	
c.b.	**Assar-i-Tewfik** .	4613	272½	52½	25	3560	La Seyne .	1868	1870 1906	..	8	..	..	..	6	..	3 *5·9-in.*, 7 *4·7-in.*, 6 *6-pr.* .	..	13·0	400	..
„	**Messoudieh** . .	9120	331½	59	25¾	11,000 Nic.	Thames . Genoa	1874	1876 1901	..	12	1	12	..	6–9	12	2 *9·2-in.*, 12 *6-in.*, 14 *3-in.*, 10 *6-pr.*, 2 *3-pr.*, 2 1.	..	17·5 *t*	600	..

Also the casemate ship Hamidieh, 6700 tons, launched 1885.

TURKEY.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
cr. .	**Abdul Hamid** . . .	3800	340	47½	16	12,500 Nic.	Elswick .	1903	1904	..	4–1½	..	2 *6-in.*, 8 *4·7-in.*, 6 *1·8-in.*, 6 M.	2	22·2 *t*	600	300
to. cr. .	**Berk-i-Satvet** . . .	740	262½	27½	..	5100	Kiel . (Germania)	1906	1907	..	..	..	2 *4-in.*, 6 *6-pr.*, 2 M., 2 l. .	3	22	240	..
„ .	**Heibetnuma** . . .	1960	226	37	14	2500 ind.	Turkey .	1890	1893	..	..	..	3 *5·9-in.* (K.), 6 *4·7-in.*, 6 Q.F.	2	14·0	..	..
g.v. .	**Lutfi-Hamayoun** . .	1313	210	35	14	2800	Turkey .	1892	1894	..	..	..	4 *6-in.* (K.), 6 *4·7-in.*, 6 Q.F.	2	13·0	..	..
cr. .	**Medjidieh**	3432	331¼	42	16	12,000 Nic.	Philadelphia	1903	1904	..	4–1½	..	2 *6-in.*, 8 *4·7-in.*, 6 *1·8-in.*, 6 M.	2	22·2	600	300
to. cr. .	**Peik-i-Shevket** . . .	740	262½	27½	..	5100	Kiel . (Germania)	1906	1907	..	..	..	2 *4-in.*, 6 *6-pr.*, 2 M., 2 l. .	3	22	240	..
„ .	**Pelenk-i-deria** . . .	840	236¼	31	16½	5000	Kiel . (Germania)	1890	1891	..	..	½	2 *4-in.* (K.), 16 M. . .	2	20·0	..	111

Despatch vessel Mermeris, 450 tons, launched 1907. Also the Feth-i-Bulend, 2806 tons, Avn-Illah, 2400 tons, and Mouin-i-Zuffer, 2400 tons. These vessels, with the Assar-i-Tewfik, Messoudieh, and Hamidieh, cruised at sea in 1909.

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UNITED STATES.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost. *	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
t.	Alabama.	11,565	368	72¼	26	11,207 *t*	Philadelphia	1898	1900	544,539	16½–4 H.S.	2¾–4	5¼ H.S.	12 H.S.	15 H.S.	6 H.S.	4 *13-in.*, 14 *6-in.*, 16 *6-pr.*, 2 *1-pr.*, 4 M., 2 l.	..	17·0 *t*	800 / 1275	592
t.	Arkansas	26,000	554	93¼	28½	28,000 tur.	Camden, N.J.	Bldg.	..	964,000	11–9 K.S.	..	..	8–6 K.S.	11 K.S.	..	12 *12-in.*, 21 *5-in.*, 4 *3-pr.*, 2 M., 2 l.	2 (sub.)	20·5	1650 / 2500	1115
a. c.	Brooklyn.	9215	400½	62	26¼	18,425 *t*	Philadelphia	1895	1896	613,583	3 H.S.	6–3	4 H.S.	..	8 H.S.	5½ H.S.	8 *8-in.*, 12 *5-in.*, 12 *6-pr.*, 4 *1-pr.*, 4 M., 2 l.	..	22·2 *t*	900 / 1622	718
,,	California	13,680	502	69½	24½	29,381 *t* B. & W.	S. Francisco.	1904	1907	756,000	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2 (sub.)	22·2 *t*	900 / 2000	829
,,	Charleston	9700	424	66	25½	27,200 B.&W.	Newport News	1904	1906	563,030	4 H.S.	3	4 H.S.	..	4 H.S.	..	14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 12 *1-pr.*, 10 M., 2 l.	..	22·0	650 / 1500	664
,,	Colorado.	13,680	502	69½	24½	26,837 Nic.	Philadelphia	1903	1905	756,000	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2 (sub.)	22·2 *t*	900 / 2000	829
t.	Connecticut	16,000	450	76¾	26¾	20,525 B. & W.	Camden, N.J.	1904	1906	819,300	11½ K.S.	3	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 20 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 (sub.)	18·8 *t*	900 / 2206	803
t.	Delaware	20,000	510	85¼	27	29,025	Newport News	1909	1910	817,300	11 K.S.	..	10 K.S.	..	11 K.S.	5 K.S.	10 *12-in.*, 14 *5-in.*, 2 *3-pr.*, 2 l., 12 M.	2 (sub.)	21·5 *t*	1000 / 2500	927
t.	Florida	21,825	510	88¼	27	28,000 tur.	New York	Bldg.	..	..	11	..	10	..	11	5	10 *12-in.*, 16 *5-in.*, 4 *3-pr.*, 4 M., 2 l.	2 (sub.)	21·0	1000 / 2300	1014
Super-posed turrets.	Georgia	14,948	435	76¼	23¾ †	25,088 *t* Nic.	Bath, Me.	1904	1906	737,700	11–4 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 12 *6-in.*, 12 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 (sub.)	19·2 *t*	900 / 1704	812
b.	Idaho	13,000	375	77	25	14,235 B. & W.	Philadelphia	1905	1909	616,360	9–4 K.S.	3–1½	7 K.S.	7 K.S.	10–7½ K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 8 *7-in.*, 12 *3-in.*, 6 *3-pr.*, 4 *1-pr.*, 8 M., 2 l.	2 (sub.)	17·2 *t*	600 / 1750	725
t.	Illinois	11,565	368	72¼	26	12,757	Newport News	1898	1901	533,237	16½–4 H.S.	2¾–4	5¼ H.S.	12 H.S.	15 H.S.	6 H.S.	4 *13-in.*, 14 *6-in.*, 16 *6-pr.*, 6 *1-pr.*, 4 M., 2 l.	..	17·45 *t*	800 / 1275	686
b.	Indiana	10,288	348	69¼	27¼	9,607 B. & W.	Philadelphia	1893	1895	620,569	18 H.S.	2¾	5 H.S.	17 H.S.	17 H.S.	10 H.S.	4 *13-in.*, 8 *8-in.*, 12 *3-in.*, 4 *6-pr.*, 2 M., 1 l.	..	15·5 *t*	400 / 1567	497

* The sums given in this column are exclusive of the cost of armour and armament according to the system of making appropriations in the estimates.

† Mean draught.

UNITED STATES.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost. *	Armour.						Armament.		Speed.	Normal Coal Supply.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b	Iowa . .	11,340	360	72¼	26¾	11,933	Philadelphia	1896	1897	618,514	14 H.S.	2¾	5 H.S.	12 H.S.	15 H.S.	8–6 H.S.	4 *12-in.*, 8 *8-in.*, 10 *4-in.*, 4 *6-pr.*, 6 M., 2 l.	..	17·1 *t*	625 / 1795	520
t.	Kansas . .	16,000	450	77	26¾	19,545 B. & W.	Camden, N.J.	1905	1906	855,850	8–11 K.S.	3–4½	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 20 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 (sub.)	18·1 *t*	900 / 2200	854
super-posed turrets	Kearsarge / Kentucky	11,540	368	72¼	25¾	11,788 / 12,179	Newport News	1898	1900	462,345 each	16½–4 H.S.	2¾–5	5½ H.S.	..	15 H.S.	9 H.S.	4 *13-in.*, 4 *8-in.*, 14 *5-in.*, 20 *6-pr.*, 8 *1-pr.*, 4 M., 2 l.	1	16·8 / 16·9 *t*	410 / 1591	690 / 686
t.	Louisiana .	16,000	450	76¾	26¾	20,748 B. & W.	Newport News.	1904	1906	819,300	11–8 K.S.	3	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 20 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 L.	4	18·8 *t*	900 / 2200	803
,,	Maine . .	12,300	388	72¼	25½	15,693 Nic.	Philadelphia	1901	1902	592,828	11–4 K.S.	2¾–4	6 K.S.	10 K.S.	12 K.S.	6 K.S.	4 *12-in.*, 16 *6-in.*, 6 *3-in.*, 8 *3-pr.*, 6 *1-pr.*, 2 M., 2 l.	2 sub.	18·0 *t*	1000 / 1800	551
a.c.	Maryland .	13,680	502	69½	24½	28,059 B. & W.	Newport News.	1903	1905	756,400	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2 sub.	22·4 *t*	900 / 1850	829
b.	Massachusetts	10,288	348	69¼	27⅓	10,240	Philadelphia	1893	1896	620,569	18 H.S.	2¾	5 H.S.	17 H.S.	17 H.S.	10–5 H.S.	4 *13-in.*, 8 *8-in.*, 12 *3-in.*, 4 *6-pr.*, 2 M., 2 l.	..	16·2 *t*	400 / 1560	509
,,	Michigan .	16,000	450	80¼	24½	16,310 B. & W.	Camden, N.J.	1908	1909	700,000	12–9	3	8	10	12–8	8	8 *12-in.*, 22 *3-in.*, 2 *3-pr.*, 12 M., 2 l.	2 sub.	18·8 *t*	900 / 2200	669
a.c.	Milwaukee .	9700	424	66	25½	24,166 W.T.	S. Francisco.	1904	1906	580,500	4 H.N.S.	3	4 H.N.S.	..	4 H.N.S.	..	14 *6-in.*, 18 *14-pr.*, 12 *3-pr.*, 12 *1-pr.*, 10 M., 2 l.	2 sub.	22·2 *t*	650 / 1500	664
t.	Minnesota .	16,000	450	77	26¾	20,235 B. & W.	Newport News	1905	1906	844,500	8–11 K.S.	3–4½	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 20 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 sub.	18·8 *t*	900 / 2200	881
b.	Mississippi .	13,000	375	77	24¾	13,607 B. & W.	Philadelphia	1905	1909	616,360	9–4 K.S.	3–1½	7 K.S.	7 K.S.	10–7½ K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 8 *7-in.*, 12 *3-in.*, 6 *3-pr.*, 4 *1-pr.*, 8 M., 2 l.	2 sub.	17·11 *t*	600 / 1750	725
t.	Missouri .	12,300	388	72¼	25½	15,845 T.	Newport News	1901	1903	592,828	12–4 K.S.	2¾–4	6 K.S.	10 K.S.	12 K.S.	6 K.S.	4 *12-in.*, 16 *6-in.*, 6 *3-in.*, 8 *3-pr.*, 4 *1-pr.*, 2 M., 2 l.	2 sub.	18·1 *t*	1000 / 1836	551
a.c.	Montana .	14,500	502	72¾	25	27,938 B. & W.	Newport News	1906	1908	970,630‡	5–3 K.S.	3	5 K.S.	6 K.S.	9 K.S.	5 K.S.	4 *10-in.*, 16 *6-in.*, 22 *3-in.*, 12 *3-pr.*, 4 *1-pr.*, 4 M., 2 l.	4 sub.	22·2 *t*	900 / 2000	845
c.d.s., *t.*	Monterey .	4084	256	59	15¼	5244 B. & W.	S. Francisco.	1891	1893	345,731	13–6 H.S.	3	..	..	13 H.S.	..	2 *12-in.*, 2 *10-in.*, 6 *6-pr.*, 4 *1-pr.*, 2 M.	..	13·6 *t*	200 / 233	218

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Super-posed turrets.	**Nebraska**	14,948	435	76½	23¾ †	21,283 B. & W.	Seattle.	1904	1906	767,210	11–4 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 12 *6-in.*, 12 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 sub.	19·1 *t*	900 1900	812
t.	**NewHampshire**	16,000	450	77	26¾	19,100 B. & W.	Camden, N.J.	1906	1908	1,600,000 (Total)	9–4 K.S.	3	7 K.S.	7 K.S.	12 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 12 *3-in.*, 12 *3-pr.*, 4 *1-pr.*, 4 M., 2 l.	4 sub.	18·2 *t*	900 2350	916
Super-posed turrets.	**New Jersey**	14,948	435	76½	23¾ †	23,089 B. & W.	Quincy,Mass.	1904	1905	699,680	11–4 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 12 *6-in.*, 12 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 sub.	19·4 *t*	900 1900	812
a c.	**New York**	8200	380½	64¾	27½	17,075	Philadelphia	1891	1893 1909	613,377	4 H.S.	2½	..	..	6½ H.S.	5–14 H.S.	4 *8-in.*, 10 *5-in.*, 8 *12-pr.*, 4 *3-pr.*, 4 M.	..	21·0 *t*	750 1334	498
a.c.	**North Carolina**	14,500	502	72¾	25	29,785 B. & W.	Newport News	1906	1908	970,630‡	5–3 K.S.	3	5 K.S.	9 K.S.	9 K.S.	5 K.S.	4 *10-in.*, 16 *6-in.*, 22 *3-in.*, 12 *3-pr.*, 4 *1-pr.*, 4 M., 2 l.	4 sub.	22·48 *t*	900 2000	845
b.	**North Dakota.**	20,000	510	85	27	31,400 Cur. tur.	Quincy,Mass.	1908	1910	899,500	11 K.S.	..	10 K.S.	..	11 K.S.	5 K.S.	10 *12-in.*, 14 *5-in.*, 2 *3-pr.*, 2 l., 12 M.	2 sub.	21·6 *t*	1000 2500	960
t.	**Ohio**	12,440	388	72½	25½	16,220 T.	S. Francisco.	1901	1904	595,705	11·4 K.S.	3–4	6 K.S.	10 K.S.	12 K.S.	6 K.S.	4 *12-in.*, 16 *6-in.*, 6 *3-in.*, 8 *3-pr.*, 6 *1-pr.*, 2 M., 2 l.	2 sub.	17·8 *t*	1000 2144	521
b.	**Oregon**	10,288	348	69¼	27¼	11,037	S. Francisco.	1893	1896	653,447	18 H.S.	2¾	5 H.S.	17 H.S.	17 H.S.	10–5 H.S.	4 *13-in.*, 8 *8-in.*, 20 *6-pr.*, 2 *1-pr.*, 4 M.	..	16·8 *t*	400 1594	500
a.c.	**Pennsylvania**	13,680	502	69½	24½	28,600 Nic.	Philadelphia	1903	1905	799,340	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2 sub.	22·4 *t*	900 2000	829
c.d.s. (2 t.)	**Puritan**	6060	290¼	60	18½	3,700	Chester	1882 reblt.	1896	..	14–6 H.S.	2	..	..	14 H.S.	..	4 *12-in.*, 6 *4-in.*, 6 *6-pr.*, 2 *1-pr.*, 4 M.	..	12·4 *t*	307	230
Super-posed	**Rhode Island**	14,948	435	76½	23¾ †	20,310 B. & W.	Quincy,Mass.	1904	1905	699,680	11–4 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 12 *6-in.*, 12 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 sub.	19·0 *t*	900 1900	812
a.c.	**St. Louis**	9700	424	66	25½	27,264 B. & W.	Philadelphia (Cramp)	1905	1906	563,030	4 K.S.	3	4–3	..	4 K.S.	..	14 *6-in.*, 18 *14-pr.*, 12 *3-pr.*, 12 *1-pr.*, 10 M., 2 l.	..	22·3 *t*	650 1500	664
b.	**South Carolina**	16,000	450	80¼	24½	18,357 B. & W.	Philadelphia (Cramp)	1908	1909	700,000	12–9	3	8	10	12–8	8	8 *12-in.*, 22 *3-in.*, 2 *3-pr.*, 12 M., 2 l.	2 sub.	18·9 *t*	900 2200	669
a.c.	**South Dakota.**	13,680	502	69½	24½	28,598 B. & W.	S. Francisco.	1904	1907	770,570	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2 sub.	22·0 *t*	900 2000	829

* See note on page 265.

† Mean draught.

‡ Including armour, but not armament.

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UNITED STATES.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost. *	Armour.						Armament.		Speed.	Normal Coal Supply.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.						in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	Tennessee	14,500	502	72¾	25	26,963 B. & W.	Philadelphia	1904	1906	970,630‡	5–3 K.S.	3	5 K.S.	6 K.S.	9 K.S.	5 K.S.	4 *10-in.*, 16 *6-in.*, 22 *3-in.*, 12 *3-pr.*, 4 *1-pr.*, 8 M., 2 l.	4 sub.	22·1 *t*	900 / 2000	858
t.	Utah	21,825	510	88¼	28½	28,000 tur.	Camden, N.J.	1909	..	813,500	11	..	10	..	11	5	10 *12-in.*, 16 *5-in.*, 4 *3-pr.*, 4 M., 2 l.	2 sub.	21·0	1000 / 2300	1014
t.	Vermont	16,000	450	77	26¾	17,982 B. & W.	Quincy, Mass.	1905	1906	858,730	8–11 K.S.	3–4½	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 20 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 sub.	18·33 *t*	900 / 2200	854
Superposed	Virginia	14,948	435	76¼	23¾ †	22,841 Nic.	Newport News	1904	1905	737,700	11–8 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 12 *6-in.*, 12 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 sub.	19·0 *t*	900 / 1900	812
a.c.	Washington	14,500	502	72¾	27	27,152 B. & W.	Camden, N.J.	1905	1906	970,630‡	5–3 K.S.	3	5 K.S.	6 K.S.	9 K.S.	5 K.S.	4 *10-in.*, 16 *6-in.*, 22 *3-in.*, 12 *3-pr.*, 4 *1-pr.*, 8 M., 2 l.	4 sub.	22·3 *t*	900 / 2000	858
,,	West Virginia	13,680	502	69½	24½	26,135 B. & W.	Newport News	1903	1905	798,310	6–3½ K.S.	4	5 K.S.	12 H.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2 sub.	22·1 *t*	900 / 2000	829
t.	Wisconsin	11,653	368	72¼	26	12,452	S. Francisco.	1898	1901	549,666	16½–4 H.S.	3–4	5⅛ H.S.	..	15 H.S.	6 H.S.	4 *13-in.*, 14 *6-in.*, 16 *6-pr.*, 6 *1-pr.*, 4 M., 2 l.	1	17·2 *t*	800 / 1310	583
t.	Wyoming	26,000	554	93¼	28½	28,000 tur.	Philadelphia	Bldg.	..	963,800	11–9 K.S.	..	..	8–6 K.S.	11 K.S.	..	12 *12-in.*, 21 *5-in.*, 4 *3-pr.*, 2 M., 2 l.	2 sub.	20·5	1650 / 2500	1115
b.	Two Battleships	27,000	..	..	..	..	..	Pro.	..	2,200,000	11	..	10	..	11	5	12 *12*-in. §	..	21·0	..	..

Also the monitors Amphitrite, Miantonomoh, Monadnock, and Terror, 3990 tons, Tonopah (*ex*-Nevada), 3714 tons, Talahasse (*ex*-Florida) and Ozark (*ex*-Arkansas), 3235 tons, Cheyenne (*ex*-Wyoming), 3218 tons, and the second-class battleship Texas, 6315 tons.

* See note on page 265. † Mean draught. ‡ Including armour, but not armament. § Uncertain.

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UNITED STATES.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost. *	Armour.		Armament.		Speed.	Normal Coal Supply.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
3rd cl. *cr.*	Albany . shd.	3487	345	43¾	20	7500	Elswick .	1899	1900	247,611	3	3–1½ shields	10 *5-in.*, 10 *3-pr.*, 12 *1-pr.*, 2 M., 1 l.	..	20·5 *t*	512 / 747	356
cr. .	Bennington . .	1710	230	36	16½	3392	Chester .	1890	1891	100,894	½	..	6 *6-in.*, 4 *6-pr.*, 4 *1-pr.*, 4 M.	..	17·5 *t*	200 / 403	195
scout .	Birmingham .	3750	420	46¾	17	15,670 Express	Quincy, Mass.	1907	1908	301,000	2–1½	..	2 *5-in.*, 6 *3-in.* . . .	2 sub.	24·3 *t*	1250	356
cr. .	Boston . . .	3000	271¼	42¼	20½	4030	Chester .	1884	1887	127,196	1½	..	2 *8-in.*, 6 *6-in.*, 6 *6-pr.*, 4 *1-pr.*, 2 M., 1 l.	..	15·6 *t*	380 / 456	282
g.v. .	Castine . .	1177	204	32	14¼	2199	Bath, Me. .	1892	1894	65,450	½	..	8 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 1 M.	..	16·0	125 / 292	151
cr. .	Chattanooga shd..	3200	292	44	16¾	5303 B.&W.	Elizabeth Port	1903	1904	212,325	2	..	10 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 4 M., 1 l.	..	16·65 *t*	470 / 700	302
scout .	Chester . .	3750	420	46¾	17	16,000 Nor. turb.	Bath, Me. .	1907	1908	337,000	2–1½	..	2 *5-in.*, 6 *3-in.* . . .	2 sub.	26·5 *t*	1250	356
3rd cl. *cr.*	Chicago . .	5273	325	48¼	22½	9000 C. & B.&W.	Chester .	1885	1889	182,677	1½	4 shield	4 *8-in.*, 14 *5-in.*, 9 *6-pr.*, 2 *1-pr.*, 2 M., 1 l.	..	18·0	831	409
„ „	Cincinnati . .	3213	300	42	20¼	8,490 B.&W.	Brooklyn .	1892	1894	226,055	2½	4	11 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 2 M.	..	19·0	350 / 468	314
cr. .	Cleveland . shd..	3200	292	44	16¾	4640 B.&W.	Bath, Me. .	1901	1903	212,325	2	..	10 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 4 M., 1 l.	..	16·4 *t*	470 / 700	302
2nd cl. *cr.*	Columbia . .	7375	412	58¼	25½	18,509	Philadelphia	1892	1894	559,950	4–2½	4 shield	1 *8-in.*, 2 *6-in.*, 8 *4-in.*, 12 *6-pr.*, 2 *1-pr.*, 2 M., 1 l.	..	22·8 *t*	750 / 1670	477
g v. .	Concord . .	1710	230	36	16½	3404	Chester .	1890	1891	100,894	½	..	6 *6-in.*, 2 *6-pr.*, 2 *3-pr.*, 2 *1-pr.*	..	16·8 *t*	200 / 401	194
3rd cl. *cr.*	Denver . shd.	3200	292	44	16¾	4135 B. & W.	Philadelphia	1902	1904	212,325	2	..	10 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 4 M., 1 l.	..	16·75	470 / 700	303
„	Des Moines						Quincy, Mass.										

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UNITED STATES.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Normal Coal Supply.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
3rd cl. *cr.*	**Detroit**	2089	257	37	16¾	5207	..	1891	1892	..	..	..	10 *5-in.*, 6 *6-pr.*, 2 *1-pr.*, 2 M., 1 l.	..	18	200 / 340	248
„	**Dubuque**	1085	174	35	13	1193 B. & W.	Morris Heights, N.Y.	1904	1905	..	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 2 M.	..	12·9	200	162
cr.	**Galveston** shd.	3200	292	44	16¾	5073 B. & W.	Richmond, Va.	1903	1904	212,325	2	..	10 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 4 M., 1 l.	..	16·4	470 / 700	302
g.v.	**Helena**	1392	250¾	40	10	1988	Newport News	1896	1897	57,536	½	2¼	8 *4-in.*, 4 *6-pr.*, 4 *1-pr.*, 2 M.	..	15·5 *t*	106 / 300	256
3rd cl. *cr.*	**Marblehead**	2089	257	37	16¾	5450	Boston	1892	1894	138,498	½	..	10 *5-in.*, 6 *6-pr.*, 2 *1-pr.*, 2 M., 1 l.	..	18·9 *t*	200 / 340	248
g.b.	**Marietta**	1000	174	34	13½	1054 B.&W.	S. Francisco.	1896	1897	45,823	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 1 M.	..	13·2 *t*	100 / 239	140
2nd cl. *cr.*	**Minneapolis**	7375	412	58¼	25½	20,862	Philadelphia	1893	1894	552,754	4–2½	4 shield	1 *8-in.*, 2 *6-in.*, 8 *4-in.*, 12 *6-pr.*, 2 *1-pr.*, 2 M., 1 l.	..	23·0 *t*	750 / 1200	477
to. cr.	**Montgomery**	2089	257	37	17	5584	Baltimore	1891	1894	125,860	½	..	4 *6-pr.*	6 (2 sub.)	18·8 *t*	200 / 340	257
g.v.	**Nashville**	1371	220	38	12	2536 C. & Y.	Newport News	1895	1897	57,536	½	..	8 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 2 M.	..	16·7 *t*	150 / 400	176

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3rd cl. *cr.*	**New Orleans**	shd.	3487	346	43¾	19¾	7500	Elswick	1896	1898	293,684	..	3–1¼ shields	10 *5-in.*, 10 *3-pr.*, 2 *1-pr.*, 2 M., 1 l.	..	20·0	512 / 767	366
2nd cl. *cr.*	**Olympia**		5870	340	53	24¾	17,313	S. Francisco.	1892	1895	369,054	4½	4–2½	4 *8-in.*, 10 *5-in.*, 14 *6-pr.*, 4 *1-pr.*, 2 M.	..	21·69 *t*	400 / 1169	450
g.v.	**Paducah**		1085	174	35	13	1000 B.&W.	Morris Heights, N.Y.	1904	1905	..	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 2 M.	..	12·0	200	162
g.b.	**Princeton**		1000	168	36	12½	923	Camden	1897	1898	47,262	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 1 M.	..	12·0	100 / 238	135
3rd cl. *cr*	**Raleigh**		3213	300	42	20¼	8500 B.&W.	Norfolk	1892	1894	226,055	2½	4	11 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 2 M., 1 l.	..	19·0	350 / 460	313
scout	**Salem**		3750	420	46¾	18¼	22,242 W.T. turb.	Quincy, Mass.	1907	1908	301,000	2–1½	..	2 *5-in.*, 6 *3-in.*	2 sub.	25·9 *t*	1250	356
3rd cl. *cr.*	**Tacoma**	shd.	3200	292	44	16¾	5288 B.&W.	S. Francisco.	1903	1904	212,325	..	2 shields	10 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 4 M., 1 l.	..	16·6 *t*	470 / 700	302
g.v.	**Vicksburg**		1000	168	36	12½	1118	Bath, Me.	1896	1898	47,406	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 1 M.	..	12·7 *t*	100 / 239	135
,,	**Wheeling**		1000	174	34	12½	1080	S. Francisco.	1897	1897	65,540	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 1 M.	..	12·9 *t*	120 / 226	140
,,	**Wilmington**		1392	250¾	40	10	1894	Newport News	1895	1897	57,536	1	2¼	8 *4-in.*, 4 *6-pr.*, 4 *1-pr.*, 4 M.	..	15·0 *t*	100 / 300	175
cr.	**Yorktown**		1710	230	36	16½	3392	Philadelphia	1888	1889	93,496	..	..	6 *6-in.*, 2 *6-pr.*, 2 *3-pr.*, 4 *1-pr.*, 2 M.	2	16·1 *t*	200 / 380	195

Third class cruisers Baltimore, Atalanta, Newark, and San Francisco, the last named converted into a mine-layer. Colliers Prometheus and Vestal (12,585 tons).

The Buffalo, Panther, Dixie, and Prairie are converted merchant vessels (3380 to 6625 tons), built 1889–93, armed with 6-in. and smaller guns.

The ocean liners St. Louis and St. Paul, 11,629 tons, New York and Philadelphia, 10,802 tons, 20 knots (International Navigation Co.), and the Korea and Siberia, 11,200 tons, 18 knots (Pacific Mail Steamship Co.) are enrolled auxiliary cruisers of the United States Navy.

* Prices exclusive of armament.

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SHIPS BELONGING TO POWERS WHOSE NAVIES ARE OF LESSER IMPORTANCE.

Bulgaria.—Eleven steamers of small size, of which one is used as the Prince's yacht. Two armoured gunboats for the Danube completing at Leghorn. The Nadiezda, a despatch vessel (715 tons), launched at Bordeaux in 1898; speed, 18·85 knots; 2600 I.H.P.; Lagrafel-d'Allest boilers; armament, 2 3·9-in., 3 1·8-in. Q.F., and 2 torpedo tubes. Three 100-ton 26-knot torpedo boats launched 1907; three smaller.

Colombia.—The cruiser Almirante Lezo (*ex* El Baschir), of 1200 tons displacement; 2500 H.P.; speed, 18 knots; built in 1892, bought from Morocco, 1902. Two gunboats, Chercuito, 643 tons, and Bogota. Two river gunboats, General Nerino and Esperanza, 400 tons.

Ecuador.—Two old (1886) French despatch vessels, Papin and Inconstant (891 tons), built of wood and iron, were bought. One torpedo boat and two steam transport vessels.

Egypt.—The Nile stern-wheel gunboats Sultan, Sheikh and Melik, 140 tons, Fateh and Naseh, 128 tons; also the Abu Klea, Hafir, Metemmeh, and Tamai.

Hayti.—Steel gunboat—Capois la Mort, 260 tons, 1 3·9-in., and 4 1-pr. Q.F. Iron corvette—Dessalines, 1200 tons, armed with 1 3·9-in. Q.F., 2 3·9-in. B.L., 2 l., 2 M. Two sloops—St. Michael and 1804. Gun-vessel, 22nd of December.

Mexico.—Two gun-vessels, Tampico and Vera Cruz, launched at Elizabethport, New Jersey, September, 1902; displacement, 980 tons; armament, 4 4-in. Q.F., 6 6-pr.; bow torpedo tube; 2400 I.H.P.; speed, 16 knots; fitted to serve as transport for 200 troops. Gun-vessels Bravo and Morero, 1200 tons; 2600 I.H.P.; Blechynden boilers; 17 knots; launched at the Orlando Yard, Leghorn, 1904. The Zaragoza, built of steel, 1200 tons, 1300 H.P., 15 knots speed, and armed with 4 4·7-in. guns and 4 small quick-firing guns. Gun-vessel, Democrata, 450 tons; 11 knots; 2 6½-in. muzzle-loaders and 2 small guns. Torpedo transport General Guerrero, 1880 tons; 1200 I.H.P.; completed at Barrow 1908. Two small gunboats of 10 knots speed. Five torpedo boats.

Peru.—Almirante Grau, cruiser, 3200 tons; 370 ft. long, 40 ft. 6 in. beam, 14 ft. 3 in. draught; launched at Barrow, March, 1906; 2 6-in., 8 14-pr., 8 1½-pr.; 2 submerged torpedo-tubes; 1½-in.

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armoured deck, 3-in. conning tower; 14,000 I.H.P.; 24 knots. A sister vessel is in hand at the same yard. Eclaireur, cruiser, 1769 tons, launched 1877, and partially reconstructed. Bought from France. Lima, built 1881, of 1700 tons displacement, 1800 I.H.P., 16 knots speed; armament, 2 6-in. B.L.R. guns. Screw steamer, Santa Rosa, of about 400 tons.

Roumania.—Elizabeta, protected cruiser (deck 3 in.), built in 1887 at Elswick; 230 ft. long, 32 ft. 10 in. beam; 1320 tons; 3000 I.H.P.; armament, 4 5·9-in. B.L.R., 4 Q.F., 2 M., 4 torpedo tubes. Composite gunboat Mircea, 360 tons; Grivitza, 110 tons. Two gunboats of 45 tons, and 3 first-class torpedo boats, these forming the sea division. For the Danube, the gunboats Fulgurul, Oltul, Siretul, Bistritza, 90 to 100 tons, the *torpilleur de barrage* Alexandru cel Bun (104 tons), 5 sloops, 2 small torpedo boats, and the paddle steamer Romania, 240 tons, repaired 1890. The shipbuilding programme includes 8 monitors of 600 tons, 12 torpedo-boats and 8 vedettes for the Danube, and 6 coast-defence vessels of 3500 tons, 4 destroyers of 300 tons, and 12 torpedo-boats for the Black Sea. Four of the monitors (3 4·7-in. guns) and 3 torpedo-boats have been completed.

Santo Domingo.—The Independencia, built in England 1894, 170 ft. long, 25 ft. broad, displacement 322 tons, and armed with seven Hotchkiss quick-firing guns. Restauracion, steel gunvessel, 1000 tons, launched at Glasgow in 1896. The 14-knot cruiser Presidente has been reconstructed, and carries seven guns.

Sarawak.—Two gunboats, of 175 and 118 tons respectively, of low speed, each armed with two guns.

Siam.—Deck-protected cruiser, Maha Chakrkri, 290 ft. long, 39 ft. 4 in. beam, of 2500 tons displacement and 17 to 18 knots speed; armament, four 4·7-in. quick-firing guns, and ten 6-pr. quick-firing guns. Makut-Rajakamar, 650 tons. The gunboats Bali, Muratha, and Sugrib, 600 tons, one 4·7-in. Q.F., five 2·2 in., four 1·4 in., 12 knots, launched 1898 and 1901. Several other gunboats. Three modern despatch vessels 100 to 250 tons. Two destroyers and two torpedo-boats said to be building in Japan.

Uruguay.—Gunboats: General Artigas, 274 tons, 12½ knots speed, 2 4·7-in. (Krupp), 2 M.; and General Saurez, 300 tons. The Italian cruiser Dogali has been purchased. A cruiser building at the Vulcan Yard, Stettin; 1150 tons; 2 4·7-in., 4 12-pr., 12 Maxims 2 torpedo tubes; 8000 I.H.P.; 23 knots.

Venezuela.—The gunboats Bolivar (571 tons, 18·6 knots) and Miranda (200 tons, 12 knots); transports Restaurador (568 tons) and Zamora (350 tons).

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BRITISH AND FOREIGN TORPEDO-BOAT FLOTILLAS.

Great Britain.

Name or Number.	Built by.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Mean Speed on Trial, or expected.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
Great Britain. TORPEDO-BOAT DESTROYERS.			Feet	Feet.	Feet.		Tons.		Knots.				Tons
†Ardent	Thornycroft	1894	201·6	19	7·3	2	265	4,500	27·97	1-12 pr. 5-6 prs.	2	45	60
Banshee	Laird	1894	210	19·5	..	2	290	4,400	27·97	1-12 pr. 3-6 prs.	2	50	60
†Boxer	Thornycroft	1894	201·6	19	7·3	2	265	4,500	27·17	1-12 pr. 5-6 prs.	2	45	60
†Bruizer	,,	1895	201·6	19	7·3	2	265	4,500	27·97	1-12 pr. 5-6 prs.	1	45	60
*Charger	Yarrow	1894	190	18·5	5·25	2	270	3,100	27·98	1-12 pr. 5-6 prs.	2	45	60
Conflict	White	1894	205·6	20	..	2	320	4,370	27·21	1-12 pr. 5-6 prs.	2	50	60
Contest	Laird	1894	210	19·5	..	2	290	4,400	27·4	1-12 pr. 3-6 prs.	1	50	60
†Daring	Thornycroft	1893	185	19	7	2	260	4,300	27·70	1-12 pr. 3-6 prs.	1	45	50
*Dasher	Yarrow	1894	190	18·5	5·25	2	255	3,182	26·21	1-12 pr. 5-6 prs.	2	45	60
Dragon	Laird	1894	210	19·5	..	2	290	4,500	27·14	1-12 pr. 3-6 prs.	1	50	60
Fervent	Hanna	1895	200	19	7·8	2	275	3,800	[27]	1-12 pr. 5-6 prs.	1	50	70
†Handy	Fairfield	1895	200	19	7·8	2	275	3,800	27·04	1-12 pr. 5-6 prs.	1	50	70
Hardy	Doxford	1895	196	19	5	2	260	4,200	26·8	1-12 pr. 5-6 prs.	2	50	70
†Hart	Fairfield	1895	185	19	7	2	275	4 010	27·07	1-12 pr. 5-6 prs.	1	50	70
*Hasty	Yarrow	1894	190	18·5	5·25	2	270	3,250	26·08	1-12 pr. 5-6 prs.	2	45	60
Haughty	Doxford	1895	196	19	5	2	260	4,000	27·1	1-12 pr. 5-6 prs.	2	50	60
Havock	Yarrow	1893	180	18·5	5·25	2	240	3,500	26·77	1-12 pr. 3-6 prs.	1	43	57
†Hunter	Fairfield	1895	200	19·7	6·5	2	275	4,000	27·2	1-12 pr. 5-6 prs.	1	45	60
Janus	Palmer	1895	200	19·7	6·5	2	275	3,789	27·8	1-12 pr. 5-6 prs.	2	50	60
Lightning	,,	1895	200	19·7	6·5	2	275	4,007	27·94	1-12 pr. 5-6 prs.	2	50	60
Lynx	Laird	1894	194	19·25	5	2	280	4,000	27·00	1-12 pr. 3-6 prs.	1	50	70
Opossum	Palmer	1895	200	19	5·2	2	295	4,052	28·24	1-12 pr. 5-6 prs.	1	50	60
Porcupine	,,	1895	200	19·7	6·5	2	275	3,866	27·91	1-12 pr. 5-6 prs.	2	50	60
Ranger	,,	1895	200	19	5·2	2	295	3,900	27·13	1-12 pr. 5-6 prs.	1	50	60
Rocket	Brown & Co.	1894	205·6	19·5	5·25	2	280	4,200	27·37	1-12 pr. 5-6 prs.	2	50	60
Salmon	Earle's Co.	1895	200	19·5	5·4	2	305	3,580	27·60	1-12 pr 5-6 prs.	2	50	60
Shark	Thomson	1894	205·6	19·5	5·25	2	280	4,250	27·59	1-12 pr 5 6 prs.	2	50	60
Snapper	Earle's Co.	1895	200	19·5	5·5	2	305	4,500	27·9	1-12 pr. 5-6 prs.	2	50	60
Spitfire	Armstrong	1895	200	19	5·3	2	295	3,780	27·5	1-12 pr. 5-6 prs.	1	45	60
Sunfish	Palmer	1895	200	19	5·2	2	295	4,292	27·62	1-12 pr. 5-6 prs.	1	50	60
Surly	Thomson	1894	205·6	19·5	5·25	2	280	4,400	28·05	1-12 pr. 5-6 prs.	2	50	50
Swordfish	Armstrong	1895	200	19	5·3	2	295	4,100	[27]	1-12 pr. 5-6 prs.	1	45	60
Teazer	White	1895	200	19·5	5·6	2	320	4,500	[27]	1-12 pr. 5-6 prs.	2	50	60
Wizard	,,	1895	200	19·5	5·2	2	320	4,400	[27]	1-12 pr. 5-6 prs.	2	45	60
Zebra	Thames Ironworks	1895	200	20	6	2	310	3,850	27·00	1-12 pr. 5-6 prs.	2	50	60
Zephyr	Hanna	1895	200	19	5·3	2	275	3,850	[27]	1-12 pr. 5-6 prs.	1	50	60
†Albatross	Thornycroft	1898	227·6	21·25	8·5	2	430	7,900	32	1-12 pr. 5-6 prs.	2	68	100
†Angler	,,	1897	210	19·6	7·1	2	310	5,800	30·37	1-12 pr. 5-6 prs.	2	60	80
Arab	Brown & Co.	1901	218	20·0	5·6	2	470	6,000	31	1-12 pr. 5-6 prs.	2	60	80
†Avon	Vickers	1896	210·6	21·6	5·6	2	355	6,000	30	1-12 pr. 5-6 prs.	2	60	80
Bat	Palmer	1896	215	20·75	6·8	2	360	6,185	30·1	1-12 pr. 5-6 prs.	2	60	91
†Bittern	Vickers	1897	210·6	21·6	5·6	2	355	6,000	30	1-12 pr. 5-6 prs.	2	60	80
Brazen	Brown & Co.	1896	218	20·0	5·6	2	315	6,000	30	1-12 pr. 5-6 prs.	2	60	80
†Bullfinch	Earle's Co.	1898	210	20·6	5·8	2	345	5,800	30	1-12 pr. 5-6 prs.	2	60	80
†Cheerful	Hawthorn	1897	210	21·0	8	2	355	6,000	30	1-12 pr. 5-6 prs.	2	62	82
†Coquette	Thornycroft	1897	210	19·5	7·2	2	335	5,800	30·31	1-12 pr. 5-6 prs.	2	60	80
Crane	Palmer	1896	215	20·7	6·8	2	360	6,336	30·3	1-12 pr. 5 6 prs.	2	60	80
†Cygnet	Thornycroft	1898	210	19·5	7·2	2	335	5,800	30·35	1-12 pr. 5-6 prs.	2	60	80
†Cynthia	,,	1898	210	19·5	7·2	2	355	5,800	30·2	1-12 pr. 5-6 prs.	2	60	80
†Desperate	,,	1896	210	19·6	7·2	2	310	5,800	30	1-12 pr. 5-6 prs.	2	60	80
†Dove	Earle's Co.	1898	210·0	20·6	5·8	2	345	5,800	30	1-12 pr. 5-6 prs.	2	60	80
Earnest	Laird	1896	210·6	21·7	5·3	2	355	6,000	30·13	1-12 pr. 5-6 prs.	2	58	80
Electra	Brown & Co.	1896	218	20·0	5·6	2	3.0	6,000	30	1-12 pr. 5-6 prs.	2	58	80
Express	Laird	1897	227 6	22·0	9	2	465	9,000	31	1-12 pr. 5-6 prs.	2	60	80
Fairy	Fairfield	1897	227·6	22·0	9	2	355	6,000	30	1-12 pr. 5-6 prs.	2	60	80
†Falcon	,,	1899	220	21·3	9	2	375	6,000	30	1-12 pr. 5-6 prs.	2	60	80
†Fame	Thornycroft	1896	210·6	19·6	7·1	2	310	5,800	30·16	1-12 pr. 5 6 prs.	2	60	80
Fawn	Palmer	1897	215	20·7	6·8	2	360	6,581	30·5	1-12 pr 5-6 prs.	2	60	91
Flirt	,,	1897	215	20·7	6·8	2	360	6,682	30	1-12 pr. 5-6 prs.	2	60	91
Flying Fish	,,	1897	215	20·7	6·8	2	360	6,416	30·4	1-12 pr. 5-6 prs.	2	58	91
†Foam	Thornycroft	1896	210	19·6	7·1	2	310	5,800	30·18	1-12 pr. 5-6 prs.	2	58	80
Gipey	Fairfield	1897	227·6	22·0	9	2	355	6,000	30	1-12 pr. 5-6 prs.	2	60	80
Greyhound	Hawthorn	1900	210	21	8·6	2	385	6,000	30	1-12 pr. 5-6 prs.	2	60	90
Griffon	Laird	1896	210·0	20	5·3	2	355	6,000	30·11	1-12 pr. 5-6 prs.	2	58	80
Kestrel	Brown & Co.	1898	218	20·0	5·6	2	350	6,000	30	1-12 pr. 5-6 prs.	2	60	80

* Built by Yarrow, fitted with Thornycroft W.T. boilers at Earle's. All Jarrow-built destroyers have Reed's boilers. Vessels marked † have Thornycroft W.T. boilers. The Skate has been used as a target.

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Great Britain—*continued.*

Name or Number.	Built by.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Mean Speed on Trial, or expected.	* Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
Torpedo-Boat Destroyers.			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Kangaroo	Palmer	1900	215	20·75	6·8	2	370	6,500	30	1–12 pr. 5–6 prs.	2	60	91
Leopard	Vickers	1897	210	20·0	5·6	2	350	6,000	30	1–12 pr. 5–6 prs.	2	60	80
Leven	Fairfield	1898	218 0	20.0	5·6	2	370	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Lively	Laird	1900	218	20·0	5·6	2	385	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Locust	,,	1896	210	21·7	5·3	2	355	6,000	30·16	1–12 pr. 5–6 prs.	2	58	80
†Mallard	Thornycroft	1896	210·6	19·6	7·1	2	310	5,800	30·11	1–12 pr. 5–6 prs.	2	60	80
Mermaid	Hawthorn	1898	210	21 0	8	2	355	6,000	30	1–12 pr. 5–6 prs.	2	60	82
Myrmidon	Palmer	1900	215	20·75	6·8	2	370	6,500	30	1–12 pr. 5–6 prs.	2	62	91
Orwell	Laird	1898	218·0	20·0	5·6	2	360	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Osprey	Fairfield	1897	227·6	22·0	9	2	355	6,000	30	1–12 pr. 5–6 prs.	2	60	80
†Ostrich	,,	1900	210	21·0	9	2	375	6,000	30	1–12 pr. 5–6 prs.	2	60	80
Otter	Vickers	1896	210	20·0	5·6	2	350	6,000	30	1–12 pr. 5–6 prs.	2	60	80
Panther	Laird	1897	210·6	21·7	5·3	2	355	6,000	30·14	1–12 pr. 5–6 prs.	2	58	80
Peterel	Palmer	1899	215	20·8	..	2	370	6,200	30	1 12 pr. 5–6 prs.	2	62	85
Quail	Laird	1895	213·6	21·6	5·3	2	355	6,000	30·38	1–12 pr. 5–6 prs.	2	58	90
Racehorse	Hawthorn	1900	210	21	8·6	2	385	6,000	30	1–12 pr. 5–6 prs.	2	60	90
Recruit	Brown & Co.	1896	218·0	20·0	5·6	2	350	6,000	30	1–12 pr. 5–6 prs.	2	58	90
Roebuck	Hawthorn	1901	210	21	8·6	2	385	6,000	30	1–12 pr. 5–6 prs.	2	60	90
Seal	Laird	1897	218·0	20·0	5·6	2	355	6,000	30·15	1–12 pr. 5–6 prs.	2	58	80
Spiteful	Palmer	1899	215	20·75	6·8	2	365	6,500	30·1	1–12 pr. 5–6 prs.	2	62	91
Sprightly	Laird	1900	218	20·0	5·6	2	385	6,000	30	1–12 pr. 5–6 prs.	2	58	80
†Stag	Thornycroft	1900	210	19·75	7·2	2	320	5,800	30	1–12 pr. 5–6 prs.	2	60	80
Star	Palmer	1896	215	20·75	6·88	2	360	6,266	30·7	1–12 pr. 5–6 prs.	2	58	91
Success	Doxford	1901	210·0	21·0	9·2¼	2	380	6,000	30	1–12 pr. 5–6 prs.	2	62	43
†Sylvia	,,	1897	210	19·9	7·6	2	350	5,400	30	1–12 pr. 5–6 prs.	2	58	80
Syren	Palmer	1900	215	20·75	6·8	2	390	6,500	30	1–12 pr. 5–6 prs.	2	..	91
Taku	Schichau	1898	193·6	20	5	2	305	6,500	32	6–3 pr. Q.	3	..	67
Thorn	Brown & Co.	1900	210	21	5·5	2	380	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Thrasher	Laird	1895	210·6	21·7	5·3	2	355	6,000	30·13	1–12 pr. 5–6 prs.	2	58	80
Vigilant	Brown & Co.	1900	210	21	5·5	2	380	6,000	30	1–12 pr. 5–6 prs.	2	58	80
†Violet	Doxford	1897	210	20·75	6·88	2	350	5,400	30	1–12 pr. 5–6 prs.	2	58	80
Virago	Laird	1895	210·6	21·7	5·3	2	355	6,000	30·13	1–12 pr. 5–6 prs.	2	58	80
a Vixen	Vickers	1900	210·0	20·0	5·8	2	400	6,000	30	1–12 pr. 5–6 prs.	2	62	88
Vulture	Brown & Co.	1898	218	20	5·6	2	345	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Whiting	Palmer	1896	215	20·75	6·88	2	360	6,239	30·2	1–12 pr. 5 6 prs.	2	58	91
Wolf	Laird	1897	218	20	5·6	2	355	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Derwent	Hawthorn	1904	220	23	10	2	534	7,000	25·68		2	70	130
‡Eden	,,	1903	220	23	8¾	6	527	7,000	26·22		2	70	130
Exe	Palmer	,,	225	23½	10	2	540	7,000	25·64		2	70	127
Ribble	Yarrow	1904	225	23½	10	2	550	7,500	26		2	70	120
Itchen	Laird	1903	225	23½	10	2	550	7,000	25·64		2	70	130
Usk	Yarrow	,,	225	23½	16	2	550	7,500	26		2	70	120
Teviot	Yarrow	,,	225	23½	10	2	550	7,500	26		2	70	120
Ettrick	Palmer	,,	225	23½	10	2	540	7,000	25·56	4–12 prs.	2	70	127
Foyle	Laird	,,	225	23½	10	2	550	7,000	25·65		2	70	120
Erne	Palmer	,,	225	23½	10	2	540	7,000	25·6		2	70	127
Arun	Laird	,,	225	23½	10	2	550	7,000	25·72		2	70	130
Cherwell	Palmer	,,	225	23½	10	2	540	7,000	25·6		2	70	127
Dee	Palmer	,,	225	23½	10	2	540	7,000	25·5		2	70	127
Jed	Thornycroft	1904	222	23½	9·6	2	640	7,500	25·98		2	70	126
Kennet	,,	1903	222	23½	9·6	2	640	7,500	25·66		2	70	126
‡Velox	Parsons	1902	210	23	8½	8	440	8,000	27	1–12 pr. 5–6 prs.	2	63	130
Waveney	Hawthorn	1903	220	23½	10	2	534	7,000	25·62	4–12 prs.	2	70	130
Welland	Yarrow	1904	225	23½	10	2	550	7,500	26		2	70	120
Chelmer	Thornycroft	1904							25·7				
Boyne	Hawthorn	1904							25·72				
Colne	Thornycroft	1905							25·57				
Doon	Hawthorn	1904							25·8				
Garry	Yarrow	1905							26·5				
Kale	Hawthorn	1904							25·74				
Rother	Palmer	1904							25·51				
Liffey	Laird	1904	222	23½	9·6	2	600	7,500	25·51	4–12 prs.	2	72	95/126
Moy	,,	1904							25·6				
Ness	White	1905							25·62				
Nith	,,	1905							25·69				
Ouse	Laird	1905							25·56				
Swale	Palmer	1905							25·59				
Ure	Palmer	1904							25·65				
Wear	Palmer	1905							25·62				

* The River class of t.b.d. have had 3 12-pr. 8 cwt. guns substituted for the 5 6-prs. they now carry.

† Have Thornycroft W.T. boilers. ‡ Hulls and Yarrow boilers of these vessels by Hawthorn Leslie & Co.

a Has four Express W.T. boilers.

Blackwater lost in collision with s.s. Hero, April 6, 1909.

Lee stranded and lost near Blacksod Bay, October 5, 1909.

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Great Britain—*continued.*

Name or Number.	Built by.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal or Oil.
OCEAN-GOING DESTROYERS.			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
‡*Afridi	Armstrong	1907	250	25	8·5	3	855	14,250	32·75	3-12-prs.	2	60	92½*e*
‡*Cossack	Laird	1907	270	26	9·3	3	890	14,000	33·15				78
‡*Ghurka	Hawthorn	1907	255	25·7	9·3	3	880	14,250	34				98
¶*Mohawk	White	1907	270	25	8·9	3	865	14,500	34·51				74
†*Tartar	Thornycroft	1907	270	26	9·1	3	872	14,500	35·67	3-12 prs.	2	68	76
¶*Saracen	White	1908	272	26	9·5	3	980	15,500	33·8	2·4-in. B.L	2	67	84*e*
†*Amazon	Thornycroft	1908	280	26½	9·2	3	970		33·25				86*e*
¶*Crusader	White	1909	280	26	9·8	3	1045	15,500	35	2·4-in. B.L.	2	71	99*e*
‡*Maori	Denny	1909	280	27	8·8	3	1035	15,500	33				103*e*
†*Nubian	Thornycroft	1909	280	26½	9·1	3	985	15,500	33				97½*e*
‡*Viking	Palmer	1909	280	27·3	8·7	3	1000	15,500	..				102½*e*
‡*Zulu	Hawthorn	1909	280	27	8·9	3	1000	15,500	34				94*e*
◊Albacore	Palmer *b*	1908	215	21	7	..	440	7,000	26·75	3-12 prs.	2	..	..
◊Bonetta													
◊Basilisk	White	1910					935						
◊Beagle	John Brown	1909					860						
◊Bulldog	,,	1909					860						
◊Foxhound	,,	1909					860						
◊Grasshopper	Fairfield	1909					890						
◊Harpy	White	1909					935						
◊Mosquito	Fairfield	Bldg.	266–275	28	8·6	3	890	12,500	27	1·4-in., 3-12 prs.	2	96	160
◊Nautilus	Thames Ironworks	,,					1050						
◊Pincher	Lenny	,,					940						
◊Racoon	Cammell Laird	1910					920						
◊Rattlesnake	Lond. & Glasgow Co.	1910					900						
◊Renard	Cammell Laird	1909					920						
◊Savage	Thornycroft	1910	264	28	9·3	3	885	12,500	27	1·4-in., 3-12 prs.	2	96	..
◊Scorpion	Fairfield	Bldg.	260–270	28	..	3	890						
◊Scourge	Hawthorn	1910	266½	28	8·6	3	925						
◊Wolverine	Cammell Laird	Bldg.	260 270	28	..	3	920						
*Stour	Cammell Laird *c*	1909	220	23·9	7·11	..	566	7,000	(25·58 / 25·62)	4-12-prs.	..	..	..
*Test													
*Acorn	John Brown	Bldg.	240	25·25	7·9	3	780	13,500	27	(2·4-in. Q.F., 2-12-prs.)	2	76	..
*Alarm													
*Brisk													
*Cameleon													
*Comet	Fairfield												
*Goldfinch													
*Fury	Inglis												
*Hope	Swan, Hunter												
*Larne													
*Lyra	Thornycroft												
*Martin													
*Minstrel													
*Nemesis													
*Nereide	Hawthorn												
*Nymphe													
*Redpole													
*Rifleman	White												
*Ruby													
*Sheldrake	Denny												
*Staunch													
23 t.b.d.'s (programme 1910–11)	..	..	..	..	..	..	..	..	..	..	..	..	..

* Fitted with turbines and for using oil fuel. † Have Thornycroft W.T. boilers. ‡ Fitted with modified Yarrow W.T. boilers.
◊ Fitted with turbines and for using coal. ¶ Fitted with White-Forster boilers.
b Purchased after completion, March, 1909, to replace Tiger and Gala.
c Purchased after completion, December, 1909, to replace Blackwater and Lee. *e* Estimated.

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Great Britain—*continued.*

Name or Number.	Built by.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal or Oil.
TORPEDO BOATS.													
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
025–027 (3 boats)..	Thornycroft.. ..	1886	127·5	12·5	6·2	1	60	600	21	2-3 prs.	3	..	10
033	Yarrow..	1886	125	13	5·5	1	66	670	19·5	2-3 prs.	5	15	20
034	White	1886	125	14·6	4	1	66	950	18–19	..	5	15	..
041, 042 (2 boats), 049–055 (7 boats), 057, 058 (2 boats)	Thornycroft.. ..	1886	127·5	12·5	6·2	1	60	700	21	2–3 prs.	4	15	..
065–068 (4 boats) .. 071–074 (4 boats) ..	Yarrow..	1886	125	13	5·5	1	75	700	19–20	2–3 prs.	5	15	20
076–078 (3 boats) ..													
079	,, ...	1886	125	13	5·5	..	75	1,000	22·4	2–3 prs.	..	15	20
80	,, ...	1887	135	14	6	1	105	1,540	23	4–3 prs.	5	21	30
81 (*ex*-Swift).. ..	White	1885	150	17·5	..	1	125	..	..	6–3 prs.	3	25	35
82, 83 (2 boats) ..	Yarrow..	1889	130	13·5	5·5	1	85	1,100	23	3–3 prs.	3	19	20
85–87 (3 boats) ..	,, ...	1889	130	13·5	5·5	1	85	1,100	23	3–3 prs.	3	19	20
88, 89 (2 boats) ..	,, ...	1894	142	14·75	4·5	1	112	1,600	..	3–3 prs.	3	18	20
90	,, ...	1895	140	14·25	3·7	1	100	1,430	..	3–3 prs.	3	18	18
91, 92 (2 boats) ..	Thornycroft.. ..	1894	140	15·5	7·5	1	130	2,400	23-24	3–3 prs.	3	18	25
93	,, ...	1893	140	15·5	5·4	2	130	2,200	23·5	3-3 prs.	3	18	25
95, 96 (2 boats) ..	White	1894	140	15·5	..	1	130	2,000	23·2	3–3 prs.	3	18	25
97	Laird	1893	140	15·5	..	1	130	2,690	23·35	3–3 prs.	3	18	25
98, 99 (2 boats) ..	Thornycroft.. ..	1901	160	17	8·4	1	178	2,850	25	3–3 prs.	3	32	20
101	M'Arthur	1888	130 5	14	..	1	92	1,060	21	2–3 prs.	3	18	35
102, 103 (2 boats)..	Thornycroft . .	1888	134·6	14 8	7·1	1	96	1,050	23·2	2-3 prs.	3	18	..
104–106 (3 boats)..	White	1889	130	14·5	..	1	95	1,250	20	2–3 prs.	3	18	..
107, 108 (2 boats)..	Thornycro't.. ..	1901	160	17	8·4	1	178	2,850	25	3–3 prs.	3	32	20
109–113 (5 boats)..	,, ...	1902	166	17·25	8·4	1	200	2,900	25	3–3 prs.	3	32	42
114–117 (4 boats) .	White	1903	165	17·6	8·8	1	205	2,900	25	3–3 prs.	3	32	28
*Pro. 1905–6 (5 boats (1-5) ..	¶White	1906	175	17½	5·8	3	235	3,750	26	2-12 prs.	3	35	
*Pro. 1905–6 (5 boats (6–10)†	¶Thornycroft ..	1906–7	166½	17½	6 3	3	255	3,750	27·3	2–12 prs.	3	35	20 *f*
*Pro. 1905–6 (2 boats (11–12)‡	¶Yarrow	1907	172	18	5·3	3	225	3,750	26	2-12 prs.	3	35	
*Pro. 1906–7 (4 boats (13–16) ..	White	..	182	18	5·10	3	256	4,000	26	2–12 prs.	3	..	
*Pro. 1906–7 2 boats (17–18)‡..	Penny	1907	180	18	5·6	3	251	4,000	26	2-12 prs.	3	..	
*Pro. 1906–7 2 boats (19–20)†..	Thornycroft.. ..	1907–8	178·6	18·3	6.5	3	280	4,000	26	2-12 prs.	3	..	23-5
*Pro. 1906–7 2 boats (21–22)‡..	Hawthorn	1907–8	185	18·6	6·6	3	308	4,000	26	2-12 prs.	3	..	
*Pro. 1906–7 No. 23 ‡	Yarrow..	1907	177·3	18	5·4	3	253	4,000	26	2-12 prs.	3	..	
*Pro. 1906–7 No. 24 ‡	Palmer	1908	177	17 9	6·5	3	292	4,000	26	2-12 prs.	3	..	
*Pro. 1907–8 (4 boats (25–28)	White	1908	182	18	6·6	3	283	4,000	26	2-12 prs.	3	..	25
*Pro. 1907–8 2 boats (29–30)‡	Denny	1908	180	18	5·3	3	259	4,000	26	2-12 prs.	3	..	25½
*Pro. 1907–8 2 boats (31–32)†	Thornycroft.. ..	1908	178·6	18·75	6 2	3	287	4,000	26·5	2-12 prs.	3	33	24½
*Pro. 1907–8 2 boats (33–34)‡	Hawthorn	1909	185	18 6	6·5	3	3·6	4,000	26	2-16 prs.	3	..	23½
*Pro. 1907–8 3 boats (35–36)‡	Palmer	1909	177	17·9	6 6	3	298	4,000	26	2-12 prs.	3	33	24

* Fitted with turbines and for using oil fuel. † Have Thornycroft W.T. boilers. ‡ Fitted with modified Yarrow W.T. boilers.
¶ These boats were originally named, as shown in the *Naval Annual* for 1906–1907. *e* Estimated. *f* 1000 knots.

Number.	Built by.	Launched.	Dimensions. Length.	Beam.	Number of Screws.	Submerged Displacement.	Indicated Horse-Power.	Speed. Surface.	Submerged.	Torpedo Tubes.	Complement.	Fuel.
SUBMARINES.			Feet.	Feet.		Tons.		Knots.	Knots.			Tons.
5 boats (Nos. 1–5) ..	Vickers	1901–2	63·4	11·9	1	120	150	8	5	1	7	..
3 boats (Nos. A 2–A 4, 1902–3)	,, ...	1903	100	10	1	204	450	11	7	2	..	11
9 boats (Nos. A 5–A 13, 1903–4) ..	,, ...	1904	150	..	..	204	600	16	9	2	..	..
11 boats (B Class) ..	,, ...	1905	135	13½	..	313	600	13	9	..	..	15
11 boats (1905–6) C class	,, ...	1906–7	135	13½	..	313	600	14	10	2	..	15
5 boats (1906-7) C 12–16	,, ...	1907–8	135	13½	..	313	600	13	..	2	..	15
1 boat (1906–7) D 1 ..	,, ...	1908	..	..	2	604	1,200	16	10	3	..	..
2 boats (1906–7) C 17 & C 18	Chatham	1908	135	13½	..	313	600	13	..	2	..	15
2 boats (1907–8) C 19–C 20..	Chatham	1909	135	13½	..	321	600	13	10	2	..	15
10 (1907–8)— C 21–C 24 .. .. C 25–C 30	Vickers	(1908) (1909)	135	13½	..	321	600	13	..	..	..	15
2 (1908–9) C 33–C 34 .	Chatham	Bldg.	135	13½	..	321	600	13	..	..	..	15
7 (1908–9)— C 31–C 32 .. .. C 35 C 36 .. .. C 37–C 38 .. .. D 2	Vickers .. .. ,, ... ,, ...	1909 1909 Bldg. Bldg.	135	13½	..	321	600	13	..	..	..	15
2 (1909-10) D 7–D 8..	Chatham	Bldg.	..	..	..	..	..	..	..	..	..	..
4 (1909–10) D 3–D 6..	Vickers	Bldg.	..	..	..	..	..	..	..	..	..	..
2 (1910–10) D 9–D 10	Chatham	Pro.	..	..	..	..	..	..	..	..	..	..
8 (1910–11)	.. ..	Pro.	..	..	..	..	..	..	..	..	..	..

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Argentine Republic.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Corrientes	Yarrow ..	1896	190	19·6	7·4	2	280	4,000	27·4 *t.*	1 14-pr.	3	54	80
Missiones..	Yarrow ..	1896	190	19·6	7·4	2	280	4,000	26·0 *t.*	3 6-pr, Q.F., 2 M.	3	54	80
Entre Rios	Yarrow ..	1896	190	19·6	7·4	2	280	4,000	26·7 *t.*		3	54	80
Santa Fé	Yarrow ..	1899	190	19·6	7·4	2	280	4,000	26	..	3	54	80
4 Boats	Cammell ..	Bldg.	285	29 9	9·6	..	980	19,750	32	4 4-in.	4	110	225*
4 Boats	Nantes ..	Bldg.	283·2	28·3	9·9	..	950	18,000	32	4 4-in.	4	110	250*
2 Boats	Germania ..	Bldg.	286·7	27·1	8·6	..	940	18,000	32	4 4-in.	4	110	250*
2 Boats	Schichau ..	Bldg.	279	29·6	7·3	..	890	19,000	32	4 4-in.	4	110	290*
FIRST CLASS—													
2 boats	Thornycroft	1890–1	150	14·5	5·2	2	110	1,500	24·52	3 3-prs.	3	27	22
6 boats	Yarrow ..	1890	130	13·5	6	1	85	1,200	23–24	2 3-pr. Q.F.	2	15	15

The two 150-ft. boats are named Comodoro Py and Murature.
The six 130-ft. boats are named Bathurst, Buchardo, Jorge, King, Pinedo, and Thorne. They have locomotive boilers.

* Also oil fuel 50–110 tons. Birkenhead boats, combined impulse and reaction turbines; French, Rateau; German, German Admiralty type.

Austria-Hungary.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYER—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Huszar	Yarrow ..	1905											
Streiter	Trieste ..	1906											
Ulan		1906											
Wildfang		1906											
Uskoke		1907											
Scharfschütze		1907	219·8	20·3	..	2	383	6,000	28·5	1 12-pr. 7 3-pr.	..	64	..
Dinara	Fiume ..	1908–1909											
Csikos													
Pandur													
Reka													
Turul													
Velebit													
FIRST CLASS—													
Kalman	Yarrow ..	1905											
Alligator	Trieste ..	1906–7											
Anaconda													
Drache													
Delphin													
Greif													
Hai													
Krokodil													
Moewe													
Narwal													
Pinguin													
Schwalbe			179·9	18·0	8·6	1	197	3,000	26	4 3-pr.	..	25	..
Seehund													
Wal													
Triton													
Alk	Fiume ..	Bldg.											
Echse													
Hydra													
Kormoran													
Krake													
Molk													
Phönix													
Polyp													
Skorpion													
Boa	Yarrow ..	1898–9	152·6	15·3	7·6	1	133	2,000	24·3	2 3-pr.	3	24	30
Cobra													
Kigyo													
Python													
Viper	Yarrow ..	1896	147·6	14·9	7·6	1	130	2,000	26·5	2 3-pr.	2	26	30
Natter	Yarrow ..	1896	150	17·5	8·8	2	152	2,300	26·5	2 3-pr.	3	..	30
I–XII	Trieste and Fiume	1909 Bldg.	142	14·4	5·0	..	110	2,600	26	2 3-pr.	2	..	..
SUBMERSIBLES—													
U 1 and 2 .	Fola	1908											
U 3 and 4	Kiel, Germania	1908–9	141·8	12 3	7·4	2	240–300	600–300	12·5–8·5	..	2	17	..
U 5 and 6	Fiume	1908											
U 7	Fiume	Bldg.											

About twenty torpedo boats (83 tons), built 1890–92, are of doubtful value.

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Brazil.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Para	Yarrow	1908	240	23·6	10	2	550	8,000	27·58	2 4-in., 4 3 prs.	2	..	..
Amazonas		1908							27				
Piahuy		1908							27				
Matto Grosso		1908							27				
Parahyba		1909							27·29				
Rio Grande del N.		1909							27				
Alagoas		1909							27				
Santa Catharina		1909							27				
Parana		1910							27				
Sergipe		1909							27				
FIRST CLASS—													
3 boats	Elbing	1892–3	152	17·2	7·9	2	130	2,200	28	2–1 prs.	3	24	30
Goyaz	Yarrow	1907	152·5	15 3	..	3	..	..	26·5	2–3 prs.	2	..	..
Gonzales	Thornycroft	..	152·5	15·3	..	3	..	..	26·5	2–3 prs.	2	..	..

Five additional destroyers are proposed.

Two submarine boats, Jacinto Gomez and Mello Marques.

Chili.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Capitan Orella	Laird	1896	210	21·6	5·4	2	300	6000	30·17	1-12 pr. Q.F. 5-6 pr.	2	65	90
Capitan Munoz Gamero	Laird	1896	210	21·6	5·4	2	300	6000	30·42	1-12 pr. Q.F. 5-6 pr.	2	65	90
Teniente Serrano	Laird	1896	210	21·6	5.4	2	300	6000	30·35	1-12 pr. Q.F. 5-6 pr.	2	65	90
Guardia-Marina Riquelme	Laird	1896	210	21·6	5·4	2	300	6000	30·09	1-12 pr. Q.F. 5-6 pr.	2	65	90
Capitan Merino Tarpa	Laird	1901	210	21·6	5·4	2	350	6000	30	Do.	2	65	90
Capitan O'Brien													
FIRST CLASS—													
Injeniero Hyatt, Cirujano Videla, Injeniero Mutilla, Guardia-Marina Contreras, Capitan Thompson, and Teniente Rodriguez (Viper type)	Yarrow	(1896) (1898)	152·6	15·3	7·9	1	140	2200	27·5-27·2	3-3 pr. Q.F.	3	28	40

The Thompson and Rodriguez were sent out in sections, and put together at Talcahuano and Valparaiso.

China.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
2 boats	Stettin	1897	123·5	21·7	..	..	120	..	20	2 1-pr.	3	20	15
4 boats	Kobe	1906–7	..	..	..	..	97	950	23	2 3-pr.	3	..	..
SECOND CLASS—													
1 boat	Foochow	1903	88·6	6·7	3·3	1	30	550	20·5				

About twenty older boats are said to be serviceable.

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Denmark.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
First Class—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Ormen	Copenhagen	1907	125	14·3	..	..	98	2,000	26	2 1-pr.	3	..	21
Hajen	Copenhagen	1896											
Havörnen	Copenhagen	1897	154·3	15·4	7·9	2	142	2,317	22·9	{ 1 4·7-in. 1 1-pr. }	3	..	..
Söbjörnen	Copenhagen	1898											
Delfinen	Thornycroft	1883	111·5	12·6	6	1	59	620	20	1 mach.	2	14	9
Havhesten	Thornycroft	1888	137·9	14	7	1	94	1,200	22·8	2 1-pr. revs.	4	20	15
Hvalrossen	Thornycroft	1884	114	12·6	6·5	1	64	660	18·7	1 mach.	2	14	10
Makrelen	Copenhagen	1893	140	14·2	7	2	112	1,200	..	..	..	..	16
Narhvalen	Thornycroft	1888	137·9	14	7	1	94	1,200	22·3	2 1-pr. revs.	4	20	15
Nord Kaperen	Copenhagen	1893	140	14·2	7	2	112	1,200	..	2 1-pr. revs.	4	..	16
Sölöven	Thornycroft	1887	131	14·8	6·8	1	89	1,200	23·3	2 mach.	4	20	14
Sölven	Havre	1880	94·8	10·9	3·9	1	37	450	18·1	..	2	12	5
Springeren	Copenhagen	1891	119	13	4·9	1	81	800	18·3	2 1-pr. revs.	2	20	14
Stören	Thornycroft	1887	131	14·8	6·8	1	89	1,200	23	2 mach.	4	20	14
Sværdfisken	Thornycroft	1881	110	12	6	1	49	600	20·7	1 mach.	2	14	9

Four destroyers and two boats are provided for; of these Messrs. Normand have delivered one—100 tons, 26 knots. Electric submersible Dikkeren, delivered by F.I.A.T. Co., Muggiano, 1909.—Length, 114 ft. 3 in.; beam, 11 ft.; 103–120 tons, 12·7½ knots. Two boats of the Holland type are to be built by the Whitehead company, one at Fiume, the other at Copenhagen dockyard.

France.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
Destroyers—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Arbalète	Normand	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Arc	Châlon	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Arquebuse	Normand	1902	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Balliste	Rouen	1903	183·9	20·11	10·3	2	300	6,000	29·4	1-9pr. 6-3prs.	2	62	75
Bélier	Nantes	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Bombarde	Havre (F.&C.)	1903	183·9	20·11	10·3	2	300	6,000	30·5	1-9pr. 6-3prs.	2	62	75
Bouclier	Normand	Bldg.	230·3	24·9	9·7	3	715	13,000	31	2-3·9in. 4-9pr.	4	62	160
Boutefeu	Bordeaux	1909	230·3	24·9	9·7	3	715	13,000	31	2-3·9in 4-9pr.	4	62	160
Branlebas	Normand	1907	193·9	21·3	10·3	2	320	5,000	28	1-9prs. 6-3prs.	2	62	84
Carabine	Rochefort	1902	183·9	20·11	10·3	2	305	6,300	28	1-9pr. 6-3prs.	2	62	75
Carabinier	Rouen	1908	210·6	21·9	10·3	3	430	7,200	28	6–9 prs.	3	62	120
Carquois	Rochefort	1907	190·3	19·6	10·3	2	335	7,200	30	19-pr. 4 3-prs.	2	62	37
Casque	Havre (F.&C.)	1909	230·3	24·9	9·7	3	715	13,000	31	2-3·9in. 4-9pr.	4	62	160
Catapulte	Havre (F.&C.)	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Cavalier	Normand	Bldg.	210·6	21·8	10·3	3	469	8,600	28	6–9 prs.	3	62	150
Chasseur	Normand	1909	210·6	21·9	10.3	3	454	7,200	28	6–9 prs.	3	62	120
Cimeterre	Bordeaux	1909	246·0	26	9·7	3	730	13,500	31	2-3·9in. 4-9pr.	4	62	160
Claymore	Normand	1906	190·3	20·11	10·3	2	335	6,000	30·3	1-9pr. 6-3prs.	2	62	75
Cognée	Toulon	1907	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Contelas	Rochefort	1907	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Dague	Bordeaux	Bldg.	246·0	26	9·7	3	730	13,000	31	2-3·9in. 4-9pr.	4	62	160
Dard	Rouen	1903	183·9	20·11	10·3	2	310	6,500	29·4	1-9pr. 6-3prs.	2	62	75
Durandal	Normand	1899	180·5	20·8	10·3	2	300	5,000	28	1-9pr. 6-3prs.	2	62	84
Epée	Havre (F.&C.)	1900	190·3	20·8	10·3	2	335	5,700	26	1-9pr. 6-3prs.	2	62	75
Epieu	Normand	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Escopette	Rochefort	1900	183·9	20·8	10·3	2	300	5,700	26	1-9pr. 6-3prs.	2	62	75
Etendard	Bordeaux	1908	210·6	21·9	10·3	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Fanion	Bordeaux	1908	210·6	21·9	10·3	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Fanfare	Normand	1907	193·9	21·3	10·3	2	320	5,000	28	1-9pr. 6-3prs.	2	62	84
Fantassin	Havre (F.&C.)	1909	210·6	21·8	10·3	3	469	8,600	28	6–9 prs.	3	62	150
Fauconneau	Normand	Bldg.	210·6	21·9	10·3	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Faulx	Nantes	Bldg.	230·3	24·9	9·7	3	715	13,000	31	2-3·9in. 4-9pr.	4	62	160
Flamberge	Rochefort	1901	183·9	20 8	10·3	2	300	5,700	26	1-9pr. 6-3prs.	2	62	75
Fleuret	Rochefort	1907	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Fourche	Nantes	1909	230·3	24·9	9.7	3	715	13,000	31	2-3·9in. 4-9pr.	4	62	160
Francisque	Rochefort	1904	183·9	20·11	10·3	2	305	6,300	28	1-9pr. 6-3prs.	2	62	75
Fronde	Bordeaux	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	65
Gabion	Rouen	1907	210·6	21·9	10 3	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Glaive	Rochefort	19 9	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Hache	Toulon	1908	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Hallebarde	Normand	1899	180·5	20·8	10·3	2	305	5,300	27·2	1-9pr. 6-3prs.	2	62	84
Harpon	Bordeaux	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Hussard	Lorient	1909	210·6	21·9	10·3	3	430	7,200	28	6–9 prs.	3	62	120
Janissaire	Rouen	1909	210·6	21·8	10·3	3	469	8,600	28	6–9 prs.	3	62	150
Javeline	Nantes	1903	183·9	20·11	10 3	2	300	7,000	29·3	1-9pr. 6 3prs.	2	62	75
Lasnquenet	Bordeaux	1909	210·6	21·8	10·3	3	469	8,600	28	6–9 prs.	3	62	150
Mameluck	Nantes	1909	210·6	21·8	10·3	3	469	8,600	28	6–9 prs.	3	62	150
Massue	Toulon	1908	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Mortier	Rochefort	1906	190·3	20·11	10·3	2	335	6,300	28	1-9pr. 6-3prs.	2	62	75

N.B.—"F. & C." "Forges et Chantiers." "Normand" means that the boat has been built at that firm's yard at Havre.

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France—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons
DESTROYERS—*cont.*													
Mousquet	Nantes	1902	183·9	20·11	10·3	2	300	6,300	30·2	1-9pr. 6-3prs.	2	62	75
Mousqueton	Châlon	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Obusier	Rochefort	1907	190·3	20·11	10·3	2	335	6,300	28	1-9pr. 6-3prs.	2	62	75
Oriflamme	Nantes	1908	210·6	21·9	10·3	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Pertuisane	Rochefort	1900	183·9	20·8	10.3	2	300	5,700	26	1-9pr. 6-3prs.	2	62	75
Pierrier	Rochefort	1906	190·3	20·11	10.3	2	335	6,300	28	1-9pr. 63-prs.	2	62	75
Pique	Havre (F.&C.)	1900	190·3	20·8	10.3	2	335	5,700	26	1-9pr. 6-3prs.	2	62	75
Pistolet	Nantes	1903	183·9	20·11	10.3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Poignard	Rochefort	1909	190·3	20·11	10.3	2	335	6,000	28	1-9pr. 6 3prs.	2	62	75
Rapière	Rochefort	1901	183·9	20·8	10·3	2	300	5,700	26	1-9pr. 6-3prs.	2	62	75
Sabre	Rochefort	1904	183·9	20·11	10·3	2	305	6,300	28	1-9pr. 6-3prs.	2	62	75
Sabretache	Nantes	1908	210·6	21·9	10·3	3	430	6,000	28	6–9 prs.	3	..	..
Sagaie	Havre(F.&C.)	1902	183·9	20·11	10·3	2	300	6,000	30·1	1-9pr. 6-3prs.	2	62	75
Sape	Rouen	1907	210·6	21·9	10·3	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Sarbacane	Rochefort	1903	183·9	20·11	10·3	2	305	6,300	28	1-9pr 6-3prs.	2	62	75
Spahi	Havre	1908	210·6	21·9	10·3	3	430	7,200	28	6–9 prs.	3	62	120
Stylet	Rochefort	1905	190·3	20·1$_1$	10·3	2	335	6,300	..	1-9pr. 6-3prs.	2	62	75
Takou*	Elbing	1898	193·7	21·0	..	2	280	6,000	25	6–3 pr. Q.F.	2	62	67
Tirailleur	Bordeaux	1908	206·9	21·8	9·7	3	410	7,200	28	6-9 pr.	2	62	120
Tromblon	Rochefort	1905	190·3	21 0	10·3	2	335	6,300	25	6–3 pr. Q.F.	3	62	67
Trident	Rochefort	1907	190·3	19·6	10·3	2	335	7,200	30	1-9pr. 6-3prs.	2	62	37
Voltigeur	Nantes	1909	210·6	21·9	10·3	3	430	7,200	28	6–9 prs.	3	62	120
Yatagan	Nantes	1900	190·3	20·8	10·3	2	335	5,700	26	1-9pr. 6-3prs.	2	62	33
Bory, Garnier, Rivière, Mehl, Dehorter 5 &c.	Normand, &c.	Bldg.	243	24·9	10·0	3	740	14,000	31	(2 3·9-in., 4 9 prs.	4	62	120
M 78–83 (6)	..	Pro.	243	21·9	10·0	3	750	14,000	31	(2 3·9-in., 4 9 prs.	4	62	120
Henry, Herbert (2)	..	Pro.	214·6	21·6	7 8	3	450	8,600	28	6 9 prs.	2	62	..
SEA-GOING—													
Aquilon	Normand	1895	137·8	14·6	7·9	2	127	2,000	26·17	2–3 prs.	2	34	17
Archer	Normand	1893	138	14·7	6·5	2	131	1,250	21	2–3 prs.	2	26	17
Argonaute	St. Denis	1893	141	16·4	9·3	2	132	1,500	25·1	2–3 prs.	2	34	16
Audacieux	Nantes	1900	144·2	15·2	10·0	2	152	4,200	30	2–3 prs.	3	..	18
Averne	Havre(F.&C.)	1894	141	16·4	9·3	2	133	1,500	24·4	2–3 prs.	2	27	16
Borée	Bordeaux	1900	147·7	16·7	8·0	2	160	4,400	30	2–3 prs.	2	..	18
Bourrasque	Normand	1901	147·7	16·7	8·0	2	160	4,400	31·41	2–3 prs.	2	..	18
Chevalier	Normand	1893	144·3	15·7	6·8	2	134	2,700	27·2	2–1 prs.	2	32	17
Cyclone	Normand	1898	144·2	15·2	10·0	2	152	4,200	30	2–3 prs.	2	..	18
Dauphin	Havre(F.&C.)	1894	141	16·4	9·3	2	137	1,500	25·22	2–3 prs.	2	34	16
Dragon	Normand	1892	138	14·7	8·2	2	129	1,400	25	2–3 prs.	2	26	15·5
Eclair	La Seyne	1891	144·3	14·7	7·7	2	128	1,100	21·5	3–3 prs.	2	26	17
Flibustier	Normand	1894	143	16·4	9·3	2	132	1,500	23·5	2–3 prs.	2	34	16
Forban	Normand	1895	144·2	15·2	10	2	135	3,200	31·2	2–1 prs.	2	..	..
Grenadier	Normand	1892	138	14·7	8·2	2	129	1,400	25·25	2–3 prs.	2	26	15·5
Grondeur	Havre(F.&C.)	1892	147·5	14·5	5	2	130	1,550	24	2–3 prs.	2	27	20
Kabyle	La Seyne	1891	144·3	14·7	7·7	2	128	1,100	21·6	3–3 prs.	2	27	17
Lancier	Normand	1893	138	14·7	8·2	2	128	1,400	25·79	2–3 prs.	2	26	15·5
Mangini	Nantes	1896	147·6	14·8	7·9	2	129	2,100	27·5	2–3 prs.	2	34	17
Mistral	Normand	1901	147·7	16·8	8·8	2	182	4,200	30	2–3 prs.	3	..	23
Orage	La Seyne	1891	144·3	14·7	7·7	2	128	1,100	21·7	3–3 prs.	2	26	17
Rafale	Normand	1901	147·7	16·7	8·0	2	160	4,400	31·47	2–3 prs.	2	..	18
Sarrasin	Bourdeaux	1893	139	14·7	7·7	2	131	1,100	20·5	3–3 prs.	2	26	14
Simoun	Havre(F.&C.)	1901	144·2	15·2	10·0	2	152	4,200	30	2–3 prs.	3	..	18
Siroco	Normand	1901	147·7	16·8	8·8	2	182	4,200	30	2–3 prs.	3	..	23
Tourmente	St. Denis	1893	141	16·4	9·3	..	132	1,500	24·6	2–3 prs.	2	25	15
Tramontane	Bordeaux	1900	147·7	16·7	8·0	2	160	4,400	30	2–3 prs.	2	..	18
Trombe	Nantes	1900	144 2	15·2	10·0	2	152	4,200	30	2–3 prs.	3	..	18
Typhon	Havre(F.&C.)	1901	144·2	15·2	10 0	2	152	4,200	30	2–3 prs.	3	..	18
2 Boats (1910)	..	Pro.	147·6	16·0	8·6	2	181	4,200	26	2 3 prs.	3	25	..
FIRST CLASS—													
201–205 (4 boats)	Normand	1897–8	121·4	13·4	8·6	1	84	1,700	25·9	2–1 prs.	2	23	10
206–211 (5 boats)	Bordeaux	1897–8	121·4	13·6	8·6	1	86	1,500	23·5	2–1 prs.	2	23	10
212–215 (4 boats)	Normand	1899	121·4	13·6	8·6	1	86	1,800	27	2–1 prs.	2	23	10
216–226 (11 boats)	(Cherbourg, Toulon, etc.)	1899–1902	121·6	13·6	8·6	1	86	1,500	23·5	2–1 prs.	2	23	10
227–235 (8 boats)	Bordeaux,etc.	1901	121·4	13·2	8·7	1	86	1,500	23·5	2–1 prs.	2	23	10
236–255 (20 boats)	Bordeaux,etc.	1902	121·4	13·2	8·7	1	90	1,500	23·5	2–1 prs.	2	23	10
256–257 (2 boats)	Bordeaux etc.	1900	124·8	13·2	8·7	1	97	2,000	26·0	2–1 prs.	3	24	10
258–261 (4 boats)	Bordeaux	1902	124·8	13·2	8·7	1	97	2,000	26·0	2–1 prs.	3	24	10
262 (1 boat)	Creusot	1902	124·8	13·2	8·7	1	97	2,000	26·0	2–1 prs.	3	24	10
264–265 (2 boats)	Bordeaux	1902	124·8	13·2	8·7	1	97	2,000	26·0	2–1 prs.	3	24	10
266–276 (11 boats)	Bordeaux,etc.	1902	124 8	13·2	9·6	1	97	2,000	26·0	2–1 prs.	3	24	10
277–294 (18 boats)	Bordeaux,etc.	1904	124·8	14·0	9·6	1	97	2,000	26·0	2–1 prs.	3	26	10
295–317 (23 boats)	Normand, etc.	1905											
318–367 (50 boats)	Havre, etc.	1905–7	124·8	14·0	9·6	1	97	2,000	26	2–1 prs.	3	26	10
368–369 (2 boats)	Toulon	1906											

* Captured from the Chinese at Taku, 1900.

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France—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
SUBMARINE—													
Aigrette‡	Toulon ..	1904	117·6	12·9	8·3	1	172	200	10·5	..	..	20	..
Algérien	Cherbourg ..	1901	118	9·2	..	1	146	250	8 13	..	..	9	..
Alose	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Anguille	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Bonite	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Calypso‡	Toulon ..	1907	154·3				344				7	..	..
Castor	Rochefort ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Cigogne‡	Toulon ..	1904	117·6	12·9	8·3	1	172	200	10·5	..	..	20	..
Circé ‡	Toulon ..	1907	154·3				344				7	..	..
Dorade	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Emeraude	Cherbourg ..	1906	146	12·9	12·0	2	390	600	12	..	6	16	..
Espadon‡	Cherbourg ..	1901	111·6	12·4	5·4	1	106–200	250	8–12	..	2	10	..
Esturgeon	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Follet	Rochefort ..	1901	135·8	9 5	9·5	1	185	..	8–12¼	..	..	9	..
Français	Cherbourg ..	1901	118	9·9	..	1	146	250	8–13	..	..	9	..
Gnome	Rochefort ..	1901	135·8	9·5	9·5	1	185	..	8–12¼	..	..	9	..
Grondin	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Korrigan	Rochefort ..	1901	135·8	9·5	9·5	1	185	..	8–12¼	..	..	9	..
Loutre	Rochefort ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Ludion	Cherbourg ..	1902	77	7·6	8·0	1	68	60	8	..	..	5	..
Lutin	Rochefort ..	1903	135·8	9·5	9·5	1	185	..	8–12¼	..	..	9	..
Lynx	Cherbourg ..	1902	77	7·6	8·0	1	68	60	8	..	..	5	..
Méduse	Rochefort ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Morse	Cherbourg ..	1899	118	9·0	9·0	1	144	360	8–12·3	..	1	9	..
Naïade	Cherbourg ..	1902	77	7·6	8·0	1	68	60	8	..	..	5	..
Opale	Cherbourg ..	1906	146	12·9	12·0	2	390	600	12	..	6	..	..
Otarie	Rochefort ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Oursin	Rochefort ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Perle	Cherbourg ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Phoque	Rochefort ..	1904	77	7·6	8·0	1	68	60	8	..	..	5	..
Protée	Cherbourg ..	1902	77	7·6	8·0	1	68	60	8	..	..	5	..
Rubis	Cherbourg ..	1907	154·3	12·9	12·0	2	390	600	12	..	6	16	..
Saphir	Toulon ..	1908	146	12·9	12·0	2	390	600	12	..	6	..	..
Silure‡	Cherbourg ..	1901	111·6	12·4	5·4	1	106–200	250	8–12	..	2	10	..
Sirène‡	Cherbourg ..	1901	111·6	12·4	5·4	1	106–200	250	8–12	..	2	10	..
Souffleur	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Thon	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Topaze	Cherbourg ..	1908	146	12·9	12·0	2	390	600	12	..	6	..	..
Triton‡	Cherbourg ..	1901	111·6	12·4	5·4	1	106–200	250	8–12	..	2	10	..
Truite	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Turquoise	Toulon ..	1908	146	12·9	12·0	2	390	600	12	..	6	..	..
X	Cherbourg ..	1904	122·8	10·2	7·6	2	168	220	10¼	..	..	..	..
Z	Rochefort ..	1904	135·8	9·10	9·10	1	202	190	11	..	..	..	..
Omega	Toulon ..	1905	160·6	13·9	9.0	1	301	330	11	..	4	20	..
Pluviôse, Ventôse, Nivôse, Germinal, Floréal, Prairial, Messidor, Thermidor, Fructidor, Vendémiaire Brumaire, Frimaire‡	Cherbourg ..	1907–1909	160	16·4	13·6	2	398	700	7¾–12¼	..	7	24	..
Papin, Fresnel, Berthelot‡	Rochefort ..	1908 1909	160	16·4	13·6	2	398	700	7¾–12¼	..	7	24	..
Monge, Ampère, Gay-Lussac‡	Toulon ..	1908 & 1909	160	16·4	13·6	2	398	700	7¾–12¼	..	7	24	..
Foucault, Euler, Franklin, Watt, Cugnot, Giffard, Faraday, Volta, Newton, Montgolfier Pernouilli, Joule, Coulomb, Arago, Curie, Le Verrier, (16, Prog. 1905–6)‡	Cherbourg .. Rochefort .. Toulon ..	1909 & Bldg.	160	16·4	13·6	2	398	700	7¾–12¼	..	7	24	..
Amiral Bourgeois ‡	Cherbourg	Bldg.	184·6	26·3	..	2	555–735	1,560	10–15	..	7	25	..
Archimede ‡		Bldg.	211·9	30·2	..	2	577–810	1,700	10–15	..	7	27	..
Mariotte ‡		Bldg.	212·6	..	..	2	530–625	1,440	10–15	..	6	25	..
Charles Brun ‡		Bldg.	144·6	13·6	..	2	355–450	..	10–15	..	7	20	..
Q 90–91 ‡		Bldg.	..	..	..	2	..	..	..	..	..	..	..

‡ Submersibles.

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Germany.

Name or Number.	Where built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
D 3, D 4 (2 boats)	Elbing ..	1888	184	21·8	9·6	2	300	2,000	20	4 6-pr. 2 1-pr. revs.	3	48	90
D 5, D 6 (2 boats)	Elbing ..	1888–9	190 3	23	9·6	2	320	3,000	22¼	4 6-pr. 2 1-pr. revs.	3	48	90
D 7, D 8 (2 boats)	Elbing ..	1890	190·3	23	9·9	2	380	3,500	22¼	6 Q.F.	3		
D 9	Elbing ..	1894	197·0	24 3	9·9	2	380	4,500	26	6 Q.F.	3		
D 10	Chiswick ..	1898	211·9	19 6	8·1	2	310	5,800	28·5	5 3-pr.	3	52	80
Taku (ex Hai Ying)	Elbing ..	1898	183·7	21·0	..	2	280	6,000	30	6 3-prs.	2	..	67
S 90–101 (12 boats)	Elbing ..	1900	200	23	8·9	2	350	6,000	27 5	3 3-pr.	3		
S 102–107 (6 boats)	Elbing ..	1900–1	200	23	8·9	2	350	6,000	27·5	3 3-pr.	3		
G 108–113 (6 boats)	Kiel(Germania)	1901–2	200	22	8·9	2	350	6,000	29·2	3 3-pr.	3	49	100
S 114–119 (6 boats)	Elbing ..	1902–3	200	23	8·9	2	350	6,000	29·2	3 3-pr.	3	49	100
S 120–125 (6 boats)	Elbing ..	1904	200	23	8·9	2	350	6,000	29·2	3 3-pr.	3	49	100
S 126–131 (6 boats)	Elbing ..	1904–5	205	23	..	2	420	6,800	30	3 6-pr.	3	56	100
G 132–136 (5 boats)	Kiel(Germania)	1906	207·4	23	8·9	2	420	6,500	28	4 6-pr.	3	..	..
G 137	Kiel(Germania)	1907	226·4	25·4	9·8	3	570	10,000	32	1 14-pr. 3 3 pr.	3	72	170
S 138–149 (12 boats)	Elbing.. ..	1906–7	331	25·7	8·9	2	530	10,000	30	1 23-pr. 3 4-pr.	3	72	170
V 150–161 (12 boats)	Stettin(Vulcan)	1907–8	269	25·7	10·0	2	670	10,500	30	2 23-pr. 2 M.	3	83	175
V 162–164 (3 boats)	Stettin(Vulcan)	1908–9	..	..	..	..	616	15,000	30	2 23-pr. 2 M.	3	..	160
S 165–168 (4 boats)	Elbing	1908–9	..	..	..	..	616	15,000	30	2 23 pr. 2 M	3	..	160
G 169–173 (5 boats)	Kiel(Germania)	1908–9	..	..	..	..	616	15,000	30	2 23-pr. 2 M.	3	..	160
G 174–175 (2 boats)	Kiel(Germania)	1909											
S 176–179 (4 boats)	Elbing ..	and	..	..	..	..	..	..	..	..	..	..	..
V 180–185 (6 boats)	Stettin(Vulcan)	Bldg.											
FIRST CLASS—													
S 42—S 65 (24 boats)	Elbing ..	1892	150	15·6	6·7	..	85–88	1,600	20–22¼	2 1-pr. revs.	2	..	17
S 66—S 73 (8 boats)	Elbing ..	1893	154·3	16·4	..	2	110 145	1,600	..	..	3		
S 74—S 87 (14 boats)	Elbing ..	1894–8	158·2	16·9	9·0	2	140	2,300	26	2 1-pr. revs.	3	..	32
G 88—G 89 (2 boats)	Kiel(German'a)	1898	154 3	16·5	..	..	160	2,500	26	2 mach.	3	22	

NOTE.—The German destroyers (S 90 to V 185) are given above in groups showing successive yearly programmes, the last series being that of 1909. S 165–168 are said to have been sold to Turkey.

The Estimates of 1910 provide for the building of two divisions of destroyers (12 boats). A submarine boat (U 1), 180 tons, 128 ft. long, 8 ft. 10 in. beam, submerged displacement 240 tons, speed 12 and 9 knots, launched at the Germania Yard, August 30, 1905; U 2, 3, and 4 at Danzig, U 5-8 at Germania Yard, completed; others building. The V destroyers have A.E.G. turbines; S boats, Schichau; and most of the G boats Parsons turbines (G 173, Zoelly).

Greece.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Naukratoussa .. Thyella .. .. .. Sphendoni .. .. Lonchi	Yarrow ..	1906	220	20·6	7·2	2	350		32·1 31·79 31·84 32·53	2 12, 4 6-pr.	2	58	80
Nike.. .. .. .. Aspis .. .. .. Doxa.. .. .. .. Velos	Stettin (Vulkan)	1906	220	20·6	7·2	2	350	..	30	2 12, 4 6-pr.	2	58	80

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Italy.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Destroyers—													
Fulmine, Lampo, Freccia	Sestri (Odero)	1898	200	20·4	5·4	2	298	4,800	28	1 12-pr., 3 6-pr. Q.F.	3	43	60
Dardo, Strale, Euro, Ostro, Nembo, Turbine	Elbing (Schichau)	1899, 1901	196·8	21·3	5·8	2	320	6,000	30	1 12-pr. Q.F., 5 6-pr.	2	53	60
Aquilone, Borea, Meteoro, Tuono	Naples (Pattison)	1901, 1902	210	19·4	7·6	2	330	6,000	30	1 12-pr. Q.F., 5 6-pr.	2	53	66
Zeffiro, Espero	Naples (Pattison)	1904	210	19·4	7·6	2	330	6,000	30	1 12-pr. Q.F., 5 6-pr.	2	53	60
Bersagliere, Artigliere, Granatiere, Lanciere, Alpino, Corazziere, Pontiere, Carabinieri, Fucilieri, Garabaldino	Genoa (Ansaldo, Armstrong)	1906, 1907, 1909, 1910	211·6	20·0	7·6	3	365	6,000	30	4 12-pdr.	3	55	82
First Class—													
Aquila, Sparviero, Nibbio, Avvoltoio, Falco	Elbing ..	1888	152	17·2	7·9	2	130	2,200	26·6	2 3-pr. Q.F., 1 1-pr. Q.F., 1 1-pr. rev.	3	24	40
Pellicano	Sestri (Odero)	1899	157·4	19	14·8	2	147	2,700	25	2 3-pr.	2	28	24
Condore	Sestri (Ansaldo)	1898	154·3	16·8	6·9	2	136	2,500	27	2 3-pr.	2	27	16
Sirio, Sagittario, Spica, Scorpione, Serpente, Saffo	Elbing ..	1905, 1906, 1906, 1905, 1905, 1906											
Alcione, Ardea, Albatros, Alcrone, Astore, Arpia	Odero	1905, 1906	164	19·6	6·3	2	215	2,900, 3,250	25	2 3-pr.	2		40
Orione, Orsa, Olympia, Orfeo	Genoa (Ansaldo)	1905, 1906											
Gabbiano	Spezia	1907											
Pegaso	Naples (Pattison)	1905											
Perseo, Procione, Pallade, Cigno		1905, 1905											
Cassiopea, Calliope, Clio, Centauro, Canopo	Naples (Pattison)	1906, 1907, 1906, 1907, 1907	164	17·4	7·0	2	200	3,000	25·4, 26·6	3 3-pr.	3		40
Calipso, Climene	Naples (Pattison)	1909, 1909											
Second Class—													
No. 117	..	1895	131·2	16·4	..	1	85	1,000	..	2 1 pr. Q.F.	2	17	17
Nos. 136–8, 140–2 (6 boats)	Italy	1893–94	131·2	16·4	..	1	85	1,000	22	2 1-pr. Q.F.	2	17	17
Nos. 147–152 (6 boats)	Italy ..	1894–5	131·2	16·4	..	1	85	1,000	22	2 1-pr. Q.F.	2	17	17
Submarine—													
Delfino	Spezia	1894	78·6	10·1	..	1	111	150	10–12	..	2	12	..
Glauco, Squalo, Narvalo, Otaria, Tricheco	Venice, &c.	1906, 1907, 1909	120	14·3	..	..	180, 230	..	15	..	2	..	..
Foca and 12 others	Muggiano ..	1908 & Pro.	139·6	14·2	..	..	241, 297	750	10·15, 8·3	..	2	..	..

Ten destroyers (500 tons) and thirty torpedo-boats are in the programme of 1909. The new Italian destroyers have Thornycroft water-tube boilers.

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Japan.

Name or Number.	Where Built.	Launched.	Dimensions			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Murakumo	Thornycroft	1898											
Shinonome	Thornycroft	1898											
Yugiri	Thornycroft	1898	210·0	19·5	7·2	2	307	5,800	30 to 31	1 12-pr., 5 6-prs.	2	54	80
Shiranui	Thornycroft	1899											
Kagerou	Thornycroft	1899											
Usugumo	Thornycroft	1900											
Shirakumo	Thornycroft	1901	216·7	20·7	8·3	2	373	7,400	31	1 12-pr., 5 6-prs.	2	59	96
Asashio	Thornycroft	1902											
Ikadsuchi	Yarrow	1898											
Inadsuma	Yarrow	1899	220·0	20·6	9·6	2	311	6,000	31	1 12-pr., 5 6-prs.	2	55	95
Akebono	Yarrow	1899											
Sazanami	Yarrow	1899											
Oboro	Yarrow	1899	220·3	20·6	9·6	2	311	6,000	31·62	1 12-pr., 5 6-prs.	2	..	90
Niji	Yarrow	1899	220·3	20.6	9·6	2	308	6,000	31 15	1 12-pr., 5 6 -prs.	2	..	90
Kasumi	Yarrow	1902	220·3	20·6	9·6	2	335	6,000	31	1 12-pr., 5 6-prs.	2	..	..
Asagiri	Yokosuka	1902											
Hurusame	Yokosuka	1902	220·3	20·6	9·6	2	374	6,000	29	1 12-pr., 5 6-prs.	2	..	..
Murasame	Yokosuka	1902											
Yamahiko	Port Arthur	1903											
Fumizuki	Port Arthur	1903	196·9	18·4	11·5	2	250	6,000	27	1 12-pr., 5 3-prs.	2	..	80
Satsuki	St. Petersburg	1902											
Hatsushima	Yokosuka	1905											
Yayoi	Yokosuka	1905											
Kisaragi	Yokosuka	1905											
Hibiki	Yokosuka	1906											
Wakaba	Yokosuka	1905											
Hatsuyuki	Yokosuka	1906											
Kamikaze	Yokosuka	1905											
Ariake	Yokosuka	1905											
Fubuki	Yokosuka	1905											
Arare	Yokosuka	1905											
Yunagi	Maizuru	1906											
Oite	Maizuru	1905											
Asakase	Kobe	1905											
Harukase	Kobe	1905											
Shigure	Kobe	1906											
Hatsuharu	Kobe	1906											
Yuguri	Sasebo	1905											
Yudachi	Sasebo	1906	220·3	20·6	9·6	2	374	6,000	29	6 12-pr.	2	..	..
Mikadzuki	Sasebo	1906											
Nowake	Sasebo	1906											
Uschio	Kure	1905											
Nenohi	Kure	1905											
Shiratsuyu	Nagasaki	1906											
Shirayuki	Nagasaki	1906											
Matsukase	Nagasaki	1906											
Shirotaye	Nagasaki	1906											
Asatsuyu	Osaka	1907											
Hayakase	Osaka	1906											
Kikutsuki	Uraga	Bldg.											
Minatsuki	Uraga	Bldg.											
Nagatsuki	Uraga	1907											
Utsuki	Uraga	1907											
Isonami	Yokosuka	1909											
Uranami	Yokosuka	1909											
Ajanami	Yokosuka	1909											
Kaifu	Maizuru	1909											
Umikaze	Nagasaki	Bldg.	..	..	..	..	1200	20,500	35	1 4·7-in., 4 3-in.	3	..	..
Another	..	Pro.											
FIRST CLASS—													
Hayabusa	Normand	1898											
Kasasagi	Normand	1899	147·7	16·0	8·2	2	150	4,200	30	1 6-pr., 2 3-prs.	3	26	30
Manadzuru	Normand	1899											
Chidori	Normand	1900											
Shirataka	Elbing	1899											
Aoataka	Kure	1903											
Hato	Kure	1903											
Hibari	Kure	1903	147·7	16·0	8·2	2	150	4,200	27	1 6-pr., 2 3-prs.	3	26	30
Kari	Kure	1903											
Kiji	Kure	1903											
Tsubame	Kure	1903											

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Japan—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—*contd.*			Feet.	Feet.	Feet.		Tons.		knots.				Tons.
FIRST CLASS—*contd.*													
Hashitaka	Kawasaki ..	1902											
Kamone	Kure	1904											
Otori	Kawasaki ..	1904	147·7	16·0	8·2	2	150	4,200	27	1 6-pr., 2 3-prs.	3	26	30
Sagi	Kure	1902											
Uzuri	Kure	1902											
Fukuriu	Kiel	1895	..	..	..	..	115	..	..	..	..	..	..
SECOND CLASS—													
2 boats	Kobe	1901	..	..	..	..	83	..	..	..	..	..	..
10 boats	Yarrow ..	1900	152·6	15·3	7·9	..	..	1,900	27	2 3-prs	3	..	36
16 boats	Elbing ..	1891-9	..	..	..	..	..	..	..	..	..	..	..
1 boat (No. 24) ..	Normand ..	1891	118	13·1	6·9	1	80	1,200	23	2 1-prs.	2	21	10
2 boats	Normand ..	1898	121·4	13·6	8·6	1	86	1,800	27	1 3-pr.	2	..	10
SUBMARINES—	[U.S.A.												
5 boats	Fore River,	1904-5	65	12	..	..	120	..	8	..	1	..	..
2 boats	Japan	1906	..	..	..	..	60·80	..	..	..	1	..	..
2 boats	Vickers ..	1908	135	13·5	..	..	325	..	14	..	2	..	..
5 boats	Japan	Bldg.	..	..	..	..	..	..	..	..	..	..	..

Netherlands.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
2 boats (1909).. ..	Flushing ..	Bldg.	230	20·6	..	2	415	7,500	30	4 12-pr., 4 M.	2	84	80
2 boats (1910).. ..		Pro.											
FIRST CLASS—													
Ardjoeno	Yarrow ..	1886	125	13	6	1	83	860	21	2 1-prs.	2	16	10
Batok	Amsterdam	1887	125	13	6·9	1	83	725	20	2 1-prs.	2	16	10
Cycloop	Amsterdam	1887	125	13	6·9	1	83	680	20	2 1-prs.	2	16	10
Dempo	Amsterdam	1887	125	13	6·9	1	83	760	20	2 1-prs.	2	16	10
Empong	Yarrow ..	1888	128	13	6·2	1	91	1,100	24·1	2 1-prs.	3	16	15
Foka	Amsterdam	1888	128	13	6·2	1	90	1,000	22·1	2 1-prs.	3		
Goentoer	Amsterdam	1888	128	13	6·2	1	90	950	21	2 1-prs.	3		
Habang	Amsterdam	1888	128	13	6·2	1	90	930	21·7	2 1-prs.	3		
Idjen	Amsterdam	1889	128	13	6·2	1	90	840	20·6	2 1-prs.	3		
Krakatau	Amsterdam	1889	128	13	6·2	1	90	750	19·1	2 1-prs.	3		
Scylla	Yarrow ..	1900	130	13·6	6·0	1	77	1,200	24·3	2 1-prs.	3	18	20
Hydra	Yarrow ..	1900	130	13·6	6·0	1	77	1,200	24·4	2 1 prs.	3	18	20
Ophir	Yarrow ..	1901	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Pangrango	Yarrow ..	1901	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Rindjani	Yarrow ..	1901	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Smeroe	Fijenoord ..	1904	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Tangka	Fijenoord ..	1904	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Wajang	Fijenoord ..	1904	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Minotaurus, Python	Flushing ..	1904	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Zeeslang													
Krokodil													
Draak	Flushing ..	1905	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Sfinx													
Scylla													
Meijndert Jentjes ..													
Johan van Brakel ..	Flushing,												
Van de Rijn	Rotterdam,	1904	154·3	16·5	7·9	1	144	2,000	25	2 3-prs.	3	24	..
Willem Willemsze ..	& Fijenoord												
Roemer Vlacq ..													
Pieter Constant ..	Do... ..	1906	154·3	16·5	7·9	..	144	2,000	..	2 3-prs.	3	24	..
Jacob Cleydijk ..													
Janssen de Haan ..													

All the Poplar destroyers have Yarrow water-tube boilers, and the later ones are fitted for the consumption of oil fuel.
One submarine boat, Luctor et Emergo (120 tons). Another is in hand at Flushing, 132-147 tons, 11-8 knots, 2 tubes.
A third is to be laid down.

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Norway.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Valkyrien	Elbing ..	1896	190	24·3	9·3	1	374	3,300	23·2	2 12-pdrs. 4 1-pdrs.	2	59	90
Draug	Christiania..	1908	226	25·0	..	2	550	7,500	27·0	6 12-pdrs.	3	71	95
Troll..	Christiania..	Bldg.											
FIRST CLASS—													
Varg (8), Raket (9)	Christiania..	1894	111·5	12·4	..	1	43	..	..	..	2	..	..
Hval, Delfin, Hai (3 boats)	Elbing ..	1896	128·0	15·0	6·9	1	84	1,100	24·5	2 1·4-in. Q.F.	2	..	..
Storm, Brand, Trods	Christiania..	1899	128·0	15·0	..	1	84	1,100	23	2 1·4-in. Q.F.	2		
Laks, Sild, Sael, Skrei	Christiana ..	1900	128·0	15·0	6·9	1	84	11,000	23	2 1·4-in.	2	..	..
Kjeck, Hvas, Dristig, Kvik, Djerv, Blink, Glint, Hauk, Falk	Christiana ..	1898 1903	111·5	14·5	6·3	1	65	650	19	2 1·4-in.	2	..	..
Skarv, Teist, Lom, Jo, Grib	Christiana ..	1906-7	134·5	14·9	..	1	100	1,700	25·0	2 3-pr.	..	..	..
Ravn, Orn	Christiana ..	1903	119	14·9	6·4	1	73	1,035	22·5	2 1·4-in.	2	14	13
SUBMARINE—													
Kobben	Germania Kiel	1909	131·6	14·9	..	..	205 255	440 250	12 9	..	3	..	..

Provision made for a torpedo boat in 1909.

Portugal.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
5 boats (5–9)	Elbing ..	1890–92											
Mineiro	Lisbon ..	1893	..	..	..	..	..	..	12				

Three torpedo boats building in France.

Roumania.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Naluka	Havre	1888	120·7	11·3	6·9	1	56	578	21	1 1-pr. rev.	2	..	12
Sborul	Havre	1888	120·7	11·3	6·9	1	56	578	21	1 1-pr. rev.	2	..	12
Smeul	Havre	1888	120·7	11·3	6·9	1	56	578	21	1 1-pr. rev.	2	..	12
SECOND CLASS—													
Soimul	Yarrow ..	1882	63	8	3	1	12	150	16·5	..	..	8	
Vulturul	Yarrow ..	1882	63	8	3	1	12	150	16·5	..	..	8	

8 100 ft. Torpedo Vedette Boats built by the Thames Ironworks. 4 built by Schichau, 1904.

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Russia.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
BALTIC SEA.			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
DESTROYERS—													
Kondratenko, Okhotnik, Pogranitschnik, Siberskij-Strelok ..	Abo and Helsingfors	1905	250·3	27·0	8·9	2	625	7,300	25–26	2 12-pdrs. 6 6-pdrs.	3	100	191
Amuretz, Gaidamak, Ussuretz, Vsadnik ..	Kiel (Germani..)	1905 1906	232·9	23·7	7·9	2	560	6,500	25–26	2 12-prs. 6 6-prs.	3	98	180
Emir Bukharsky, Dobrovoletz Finn, Moskvityanin.. ..	Helsingfors	1905	238	27·0	8·6	2	580	6,500	25–26	2 12-pdrs. 6 6-pdrs.	3	98	134
Donskoi – Kasak, Kasanetz, Sabaikaletz, Steregushtshi, Strashny, Trukhmenetz - Stavropolski, Ukraina, Volskovoi	Riga	1904 1906	239·9	23·7	7·6	2	508	6,200 7,020	25–27	2 12-pdrs. 4 6-pdrs.	2	90	50 120
Prytki	Poplar.. ..	1895	190	18·6	7·0	2	240	4,400	29.7	1 12-pr, 3 3-pr	2		
Revy, Retivy, Ryany, Rezviyi, Prosorlivy, Pilky, Ridny, Posluchny, Protchny, Poratsuchtchi, Prontsiteliny, Podvitsny	Abo, Ishora & Nevsky ..	1898	196·9	18·4	11·5	2	240	3,800	27	1 12-pr, 3 3-pr	2	55	53
Bravi, Vidny, Bodry	Nevsky and Ishora ..	1900–2	196 9	18·4	11·5	2	350	6,000	27	1 12-pr, 5 3-pr	3	62	80
Grozni, Grosiashtchi	St. Petersburg	1904	196·9	18·4	11·5	2	350	6,000	27	1 12-pr, 5 3-pr	3	62	80
Tverdy, Totschny, Trevozhny	Abo	1905	196·9	18·4	11·5	2	240	6,000	27	1 12-pr, 5 3-pr	3	62	80
Iskousny, Ispolnitelni, Kriepky, Legky	La Seyne ..	1905	185·9	21·0	7·5	2	324	5,600	26	1 12-pr, 5 3-pr 2 M	2	60	30 100
Lovki, Letutshi, Lichoi	Havre (Normand)	1905	185·8	21·0	7·5	2	324	5,600	27·5	1 12-pr, 5 3-pr 2 M	2	60	30 100
Boievoi, Bditelny, Burni, Vnimatelni, Vnushitelni, Vynoslivny, Sergieff, Yurasovsky, Svviereff, Dmitrieff	Elbing Schichau	1905–6	208·9	23·0		2	365	6,500	28		3		95
Silni, Storoshevoi, Stroiny, Rasyashtshy, Rastoropny, Burakoff, Dyelni, Dostoiny, Deyatelni, Myetky, Molodetsky, Moshtshny, Malieieff, Anastosoff	St. Petersburg and Ochta	1905 1907	185·9	21·0	7·5	2	335 56	5,600	26	1 12-pr, 5 3-pr 2 M	2	60	30 100
FIRST CLASS—													
Aspen	Ishora.. ..	1895	127·9	15·7	6·9	1	98	1,250	21	..	2	..	17
Domeness	Putiloff ..	1895	127·9	15·7	6·9	1	98	1,250	21	..	2	..	17
Hoglana	Ishora.. ..	1894	128	16	6·9	1	85	1,200	22	2 1-prs.	2	13	17
Nargen	Ishora.. ..	1894	128	16	6·9	1	85	1,200	22	2 1-prs.	2	13	17
Rochensalm	Putiloff ..	1890	136·5	13	7·8	..	81	1,100	21				
Sestoretsk..	Normand ..	1894	118	13·2	8·6	1	80	1,300	24	2 1-prs.	2	21	10
Transund	Ishora.. ..	1895	127·9	15·7	6·9	1	98	1,250	21	..	2	..	17
2 boats	St. Petersburg	1896	128	16	6·9	2	85	1,200	22	2 1-prs.	2	13	17
6 boats	St. Petersburg	1897	138	14·7	9·9	2	120	..	25	..	2	26	
8 boats	Nevsky ..	1898	..	..	..	..	118						
BLACK SEA.													
DESTROYERS—													
Baranoff, Shestakoff, Pustchin, Sazarenny	Nicolaieff ..	1907–8	241·6	27·0	7·9	2	614	6,500	25	6 12-pdrs.	3	90	200
Zavidni, Zavetni, Zharki, Zhutki, Zhivoi, Zhivulka, Zhivutshtshy ..	Nicolaieff ..	1903-4	210	21·2	7	2	350	5,500	27	1 12-pr, 5 3-pr	2		
Stremitelni, Strogi, Smetlivy, Svirepy	Abo	1901	190·4	18·5	11·5	2	240	3,800	27	1 12-pr, 3 3-pr	2	..	60
Zadorni, Zorki, Zvouki	Nicolaieff ..	1903	210	21·2	7	2	350	5,500	27	1 12-pr, 5 3-pr	2		
FIRST CLASS—													
A. B. C. (3 boats) ..	Nicolaieff ..	1893	126	..	..	..	81	..	21				
Adler..	Elbing ..	1890	152·0	17·2	7·9	2	130	2,200	27·4	2 1 prs.	3	24	40
Anakria	Elbing ..	1890	128·0	16	6·9	1	85	1,200	22	2 1-prs.	2	13	17
Anapa	Odessa.. ..	1891	126	13	8·5	1	81	1,100	21	2 1-pr. revs.	2	13	
Aitodorj	Odessa.. ..	1891	126	13	8·5	1	81	1,100	21	2 1-pr. revs.	2	13	
D. E. (2 boats) ..	Sebastopol ..	1893	128	..	..	..	85	..	22				
FAR EAST.													
DESTROYERS—													
Bespochtchadni, Bestrachni, Beschumni (3 boats)	Elbing ..	1899	196·9	18·4	11·5	1	350	6,000	27	1 12-pr, 5 3-pr	2		
Grozovoi, Vlastni ..	Havre(F.&C.)	1900–2	186·0	20·8	10·3	2	300	5,000	28	1 12-pr 5 3-pr	2	..	80
Bolki	Nevsky ..	1900	196·9	18·4	11·5	1	350	6,000	28	1 12-pr, 5 3-pr			

Submarine Piotr Koschka (experimental), Delfin (77 ft., 175 tons), Graf Sheremeteff completed at St. Petersburg; **Akula**, Alligator, Drakon, Kaiman, Krokodil, Minoga (400 tons, Lake type) built and building; also Kefal, Akula, Makrel, Bytshok, Nalim, Kata, Paltus, Delfin, Karp, Kambala, Karas (240 tons); Bialuga, Pescar, Shtshuka, Som, Sterliad; 13 others built or building, Lossos in the Black Sea. Five destroyers of 850 tons are building at the Nikolaieff Yard.

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Spain.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Terror	Clydebank ..	1896	220	22	5·6	2	300	6,000	28	2 12-pr. 2 6-pr. 21-pr.	2	67	100
Audaz													
Osado	Clydebank ..	1897	225	25·6	5·8	2	400	7,500	30	2 14-pr. 2 6-pr. 21-pr.	2	70	90
Proserpina													
Bustamenté	Cartagena ..												
Villamil	Cartagena ..	Bldg.	220	22	7·5	..	370	6,250*	28	5 6-pr.	2	..	..
Requescens	Cartagena ..												
FIRST CLASS—													
24 boats	Cartagena ..	Bldg. Pro.	165	16·6	..	..	180	3,750*	26	3 3-pr.	3	..	..
Azor	Poplar	1887	134·5	14	6	1	108	1,600	24	4 3-pr.	3	23	25
Halcón	Poplar	1887	134·5	14	..	1	108	1,600	24	4 3-pr.	3	23	25

Azor and Halcón re-boilered by Yarrow (water-tube). * Turbines and Normand type boilers.

Sweden.

TORPEDO BOATS.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYER—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Mode	Yarrow ..	1902	220·3	20 6	8·9	2	400	6,800	32·4	1 12-pr. 5 6-prs.	2	55	95
Magne	Thornycroft	1905											
Wale	Malmo ..	1906											
Ragnar	Malmo ..	1909											
Sigurd	Gothenburg	1909	216·9	20·8	8·2	2	430	7,200	30·0	2 12-prs. 4 6-prs.	2	63	90
Vidar	Malmo ..	1909											
Hugin	Gothenburg	1909											
Munin	Malmo ..	Bldg.											
FIRST CLASS—													
Komet	Elbing ..	1896	128	15·9	6·11	1	92	1,056	23·0	2 1·9-in. Q.F.	2	16	17
Blixt	Carlskrona ..	1898	128	15·9	6·11	1	92	1,260	23·5	2 1·9-in. Q.F.	2	18	17
Meteor	Carlskrona ..	1899	128	15·9	6·11	1	92	1,330	23·8	2 1·9-in. Q.F.	2	18	17
Stjerna	Carlskrona ..	1899	128	15·9	6·11	1	92	1,250	23·4	2 1·9-in. Q.F.	2	18	17
Orkan	Carlskrona ..	1900	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Vind	Carlskrona ..	1900	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Bris	Carlskrona ..	1900	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Virgo	Carlskrona ..	1902	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Mira	Carlskrona ..	1902	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Orion													
Sirius	Carlskrona ..	1903	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Kapella													
Pleiad	Normand ..	1905	125	15	6·6	1	96	1,900	26	2 1·5-in. Q.F.	2	18	—
Vega	Carlskrona ..	Bldg.	125	17·5	8·6	1	105	1,900	25	1 6-pr. 1 1·4-in.	2	..	..
Vesta													
Spica, Astrea, Iris, Thetis	Bergsund and Gothenburg	Bldg.	125	17·5	8·6	1	105	1,900	25	1 6-pr. 1 1·4-in.	2	..	..
Altair													
Antares	Stockholm ..	1908	128	17·5	8·6	..	110	..	25	2 6-prs.	2	18	..
Argo													
Arcturus													
Perseus, Polaris ..	Bergsund ..												
Regulus, Rigel ..	Stockholm ..	Bldg.	..	..	..	..	..	..	..	..	..	..	..
A, B, C, D	Carlskrona & Gothenburg												
SECOND CLASS—													
No. 75	Stockholm ..	1892	100·5	11·6	6·3	1	49	460	18·9	1 mach.	2	14	9
No. 77	Carlskrona ..	1891	100·5	11·6	6·3	1	49	460	18·9	1 mach.	2	14	9
No. 79	Stockholm ..	1902	104·0	12·5	6·1	1	49			1 1·5-in. Q.F.	2	14	
No. 81	Stockholm ..	1902	104·0	12·5	6·1	1	49			1 1·5-in. Q.F.	2	14	
No. 83	Stockholm ..	1903	104·0	12·5	6·1	1	49			1 1·5-in. Q.F.	2	14	
No. 85	Stockholm ..	1903	104·0	12·5	6·1	1	49			1 1·5-in. Q.F.	2	14	
THIRD CLASS—													
Nos. 141, 143, 145, 147, 149 (5 boats) ..	Stockholm ..	1879 1890	55·0	10·7	4·1	2	21	80	10	..	2	..	1·5
SUBMERSIBLES—													
Enroth	Stockholm ..	1902	82·0	13·0	11·6	2	146	100	12–11	..	1	..	..
Hajen	Stockholm ..	1903	65·0	11·6	..	..	120	200	10–7	..	..	..	..
Hvalen	Muggiano ..	1908	139·6	14·2	6·9	..	185–235	750	15–7¼	..	2	15	..

Three additional submersibles provided for 1909.

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Turkey.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Berk-Efshan	Kiel	1894	187	21·6	..	2	270	1,200	25	5 1-pr. revs.	2		
Tajjar	Kiel	1894	187	21.6	..	2	270	..	25	6 1-pr. revs.	2		
Samsoun, Basra, Tassos, Yar-Hissar	Bordeaux	1907-8	184·9	19·6	9·6	2	280	..	28	1 9-pr. 6 3-pr.	2	..	26
FIRST CLASS—													
Eliagot, Ac-Hisar	Sestri Ponente	1904	165·8	18·6	4·5	..	165	2,200	27				
Angora, Urffa, Antalia, Tokat, Deradj, Kulahia, Mossul	Sestri Ponente	1906	165·8	18·6	4·5	..	165	2,200	24				
A. B.	Sestri Ponente	1901	166	18·6	4·0	2	145	2,400	26	2·1 pr.	2	..	16
Edjder (No. 10)	Kiel	1890	152·7	18·9	7·4	2	150	2,200	23	5 3-prs. Q.F.	2		
5 boats	Kiel	1889–90	126·7	15·4	8·6	1	85	1,300	22	2 1-pr. revs.	2	21	8
2 boats	Kiel	1892	127	..	..	..	..	..	22				

Ten destroyers are intended to be purchased or built. Four, built at Elbing, have been bought by permission of the German Government, and named Jadikar-i-Millet, Muavenet-i-Millet, Mahabet-i-Watan, and Nuhum-i-Hamijet.

United States.

Name or Number	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament. Guns.	Torpedo Tubes.	Complement.	Maximum Coal Capacity.
DESTROYERS—			ft. in.	ft. in.	ft. in.		Tons.		Knots.				Tons.
Smith	Philadelphia	1909	289 0	26 0	8 0	3	700	10,362*	28·35 *t.*	5 3-in., 2 M.	3 18-in.	89	285
Lamson	Philadelphia	1909	289 0	26 0	8 0	3	700	10,000*	28			89	285
Preston	Camden, N.J.	1909	289 0	26 0	8 0	3	700	10,000*	28			89	270
Flusser	Bath, Me.	1909	289 0	26 0	8 0	3	700	11,842*	30·41 *t.*			89	295
Reid	Bath, Me.	1909	289 0	26 0	8 0	3	700	12,734*	31·82 *t.*			89	295
Paulding	Bath, Me.	Bldg.	289 0	26 1¼	8 4	3	742	12,000*	29·50			89	210
Drayton	Bath, Me.	Bldg.	289 0	26 1¼	8 4	3	742	12,000*	29·50			89	210
Roe	Newport News, Va.	1909	289 0	26 1¼	8 4	3	742	12,000*	29·50			89	210
Terry	Newport News, Va.	1909	289 0	26 1¼	8 4	3	742	12,000*	29·50			89	210
Perkins	Quincy, Mass.	Bldg	289 0	26 1¼	8 4	2	742	12,000†	29·50			89	216
Sterrett	Quincy, Mass.	Bldg.	289 0	26 1¼	8 4	2	742	12,000†	29·50			89	216
McCall	Camden, N.J.	Bldg.	289 0	26 1¼	8 4	3	742	12,000*	29·50			89	210
Burrows	Camden, N.J.	Bldg.	289 0	26 1¼	8 4	3	742	12,000*	29·50			89	210
Warrington	Philadelphia	Bldg.	289 0	26 1¼	8 4	2	742	12,000‡	29·50			89	210
Mayrant	Philadelphia	Bldg.	289 0	26 1¼	8 4	2	742	12,000‡	29·50			89	210
Monaghan	Newport News	Bldg.	289 0	26 1¼	8 4	3	742	12,000*	29·50			89	210
Trippe	Bath, Me.	Bldg.	289 0	26 1¼	8 4	3	742	12,000*	29·50			89	210
Walke	Quincy, Mass.	Bldg.	289 0	26 1¼	8 4	2	742	12,000†	29·50			89	216
Ammen	Camden, N.J.	Bldg.	289 0	26 1¼	8 4	3	742	12,000*	29·50			89	210
Patterson	Philadelphia	Bldg.	289 0	26 1¼	8 4	3	742	12,000*	29·50			89	210
Bainbridge	Philadelphia	1901	245 0	23 7	6 6	2	420	8,000	28·45	2 14-pr., 5 6-pr.§	2	64	139
Barry	Philadelphia	1902	245 0	23 7	6 6	2	420	8,000	28·13	2 14-pr., 5 6-pr.,	2	64	139
Chauncey	Philadelphia	1901	245 0	23 7	6 6	2	420	8,000	28·64	2 14-pr., 5 6-pr.	2	64	139
Dale	Richmond	1900	245 0	23 7	6 6	2	420	8,000	28	2 14-pr., 5 6-pr.	2	64	139
Decatur	Richmond	1900	245 0	23 7	6 6	2	420	8,000	28·10	2 14-pr., 5 6-pr.	2	64	139
Hopkins	Wilmington	1902	244 0	24 6	6 0	2	408	8,456	29·02	2 14-pr., 5 6-pr.	2	64	150
Hull	Wilmington	1902	244 0	24 6	6 0	2	408	9,119	28·04	2 14-pr., 5 6-pr.	2	64	150
Lawrence	Quincy, Mass.	1900	242 3	22 3	6 2	2	400	8,400	28·41	2 14-pr., 5 6-pr.	2	64	115
Macdonough	Quincy, Mass.	1901	242 3	22 3	6 2	2	400	8,400	28·03	2 14-pr., 5 6-pr.	2	64	115
Paul Jones	San Francisco	1900	245 0	23 7	6 6	2	420	8,000	28·91	2 14-pr., 5 6-pr.	2	64	139
Perry	San Francisco	1900	245 0	23 7	6 6	2	420	7,950	28·32	2 14-pr., 5 6-pr.	2	64	139
Preble	San Francisco	1901	245 0	23 7	6 6	2	420	7,370	28·03	2 14-pr., 5 6-pr.	2	64	139
Stewart	Morris Heights	1902	245 0	23 7	6 6	2	420	8,000	29·69	2 14-pr., 5 6-pr.	2	64	139
Truxtun	Baltimore	1901	248 0	23 3	6 0	2	433	8,300	29·58	2 14-pr., 5 6-pr.	2	64	232
Whipple	Baltimore	1901	248 0	23 3	6 0	2	433	8,300	28·24	2 14-pr., 5 6-pr.	2	64	232
Worden	Baltimore	1901	248 0	23 3	6 0	2	433	8,300	29·86	2 14-pr., 5 6-pr.	2	64	232

* Parsons turbines. † Curtis turbines. ‡ Zoelly turbines.
§ Guns of destroyers of this class are Driggs Semi-Automatic Quick-Firers.

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United States—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.		Complement.	Maximum Coal Capacity.
			Length.	Beam.	Draught.					Guns.	Torpedo Tubes.		
Sea-Going—			ft. in.	ft. in.	ft. in.		Tons.		Knots.				
Bagley	Bath	1900	157 0	17 0	4 7	2	167	4,200	29·15	3 3-pr.	3	29	..
Bailey	Morris Heights	1899	205 0	19 0	6 0	2	235	5,600	30·20	4 6-pr.	2	..	20
Barney	Bath	1900	157 0	17 0	4 7	2	167	4,200	29·04	3 3-pr.	3	29	..
Biddle	Bath	1900	157 0	17 0	4 7	2	167	4,200	28·57	3 3-pr.	3	29	..
Blakely	Boston	1902	175 0	17 6	4 8	2	165	3,000	25·58	3 3-pr.	3	29	70
De Long	Boston	1901	175 0	17 6	4 8	2	165	3,000	25·52	3 3-pr.	3	29	70
Du Pont	Bristol, R.I.	1897	175 0	17 8	4 8	2	165	..	28·58	4 1-pr.	3	32	76
Foote	Baltimore	1896	160 0	16 1	5 0	2	142	2,000	24·53	3 1-pr.	3	24	44
Porter	Bristol, R.I.	1896	175 0	17 8	4 8	2	165	..	28·63	4 1-pr.	3	32	76
Rodgers	Baltimore	1896	160 0	16 1	5 0	2	142	2,295	24·49	3 1-pr.	3	24	44
Rowan	Seattle, Wash.	1898	170 0	17 0	5 11	2	182	3,200	27·07	4 1-pr.	3	32	60
Shubrick	Richmond	1899	175 0	17 6	4 8	2	165	3,375	26·07	3 3-pr.	3	29	70
Stockton	Richmond	1899	175 0	17 6	4 8	2	165	3,275	25·79	3 3-pr.	3	29	70
Tingey	Baltimore	1902	175 0	17 6	4 8	2	165	3,000	24·94	3 3-pr.	3	29	70
Wilkes	Morris Heights	1901	175 0	17 6	4 8	2	165	3,495	25·99	3 3-pr.	3	29	70
Winslow	Baltimore	1897	160 0	16 1	5 0	2	142	2,000	24·82	3 1-pr	3	24	44
Cushing	Bristol, R.I.	1890	138 9	14 3	4 11	2	105	1,720	22·50	3 1-pr.	3	23	36
Dahlgren	Bath	1899	147 0	16 4	4 7	2	146	4,200	30	4 1-pr.	2	..	32
Davis	Portland, Ore.	1898	146 0	15 4	5 4	2	132	1,750	23·41	3 1-pr.	3	..	..
Ericsson	Dubuque, Iowa	1894	149 7	15 6	4 9	2	120	1,800	24	4 1-pr.	3	23	35
Farragut	San Francisco	1898	213 6	20 8	6 0	2	273	5,878	30·13	4 6-pr.	2	..	76
Fox	Portland, Ore.	1898	146 0	15 4	5 4	2	132	1,750	23·13	3 1-pr.	3	..	..
Goldsborough	Portland, Ore.	1902	194 8	20 5	5 0	2	247·5	6,000	27·40	4 6-pr.	2	..	131
Morris	Bristol, R.I.	1898	138 3	15 6	4 1	2	105	1,750	24	3 1-pr.	3	..	28
Somers	Schichau, Elbing	1898	149 3¼	17 5	..	2	145	1,900	17·5	..	..	..	..
Stringham	Wilmington	1899	225 0	22 0	6 6	2	340	7,200	25·33	7 6-pr.	2	..	120
T. A. M. Craven	Bath	1899	147 0	16 4	4 7	2	146	4,200	30	4 1-pr.	2	..	32
Thornton	Richmond	1900	175 0	17 6	4 8	2	165	3,000	24·88	3 3-pr.	3	29	70
Third Class—													
Gwin	Bristol, R.I.	1897	99 6	12 6	3 3	1	46	850	20·88	1 1-pr.	2	..	8
Mackenzie	Philadelphia	1898	99 3	12 9	4 3	1	65	850	20	1 1-pr.	2	..	15·3
McKee	Philadelphia	1898	99 3	12 9	4 3	1	65	850	19·82	2 1-pr.	2	..	..
Talbot	Bristol, R.I.	1897	99 6	12 6	3 3	1	46	850	21·15	1 1-pr.	2	..	8·8
Submarine—													
Adder	Elizabethport	1901	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Grampus	S. Francisco	1902	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Holland	Elizabethport	1896	54 0	10 3	..	1	74	150	8	..	1	5	..
Moccassin	Elizabethport	1901	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Pike	S. Francisco	1902	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Plunger	Elizabethport	1902	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Porpoise	Elizabethport	1901	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Shark	Elizabethport	1901	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Cuttlefish	Quincy, Mass.	1906											
Viper	Quincy, Mass.	1909	80 6	13 0	..	..	170		8¼—10				
Tarantula	Quincy, Mass.	1909											
Octopus	Quincy, Mass.	1906	106 0	..	..	..	273						
Stingray		1909											
Tarpon		1909					{239–274}	500	..	..	2	..	..
Bonita		1909	..	..	..	..							
Snapper	Quincy, Mass.	1909											
Narwhal		1909											
Grayling		1909	..	..	..	..	{278–310}	..	..	..	4	..	..
Salmon		1909											
Skipjack	Quincy, Mass.	Bldg.											
Sturgeon													
Carp	San Francisco												
Barracuda			..	..	..	..	..	..	..	..	..	..	..
Pickerel	Seattle												
Skate													
Thrasher	Philadelphia												
Tuna	Newport News												
Seal	Newport News	1909	160 0	12 4	..	..	503	..	9¼–16	..	6	..	..
Nos. 28–31 (4)	..	Pro.	..	..	..	..	..	..	..	..	..	..	..
Nos. I.–III. (3)*													

* Sub-surface destroyers.

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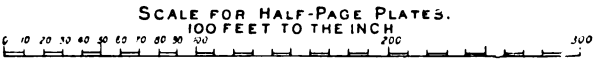
PLANS

OF

BRITISH AND FOREIGN SHIPS.



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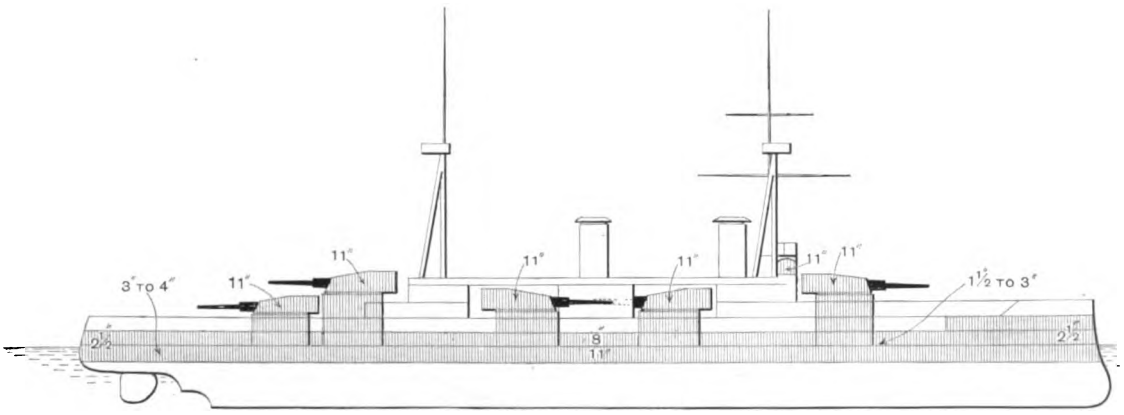
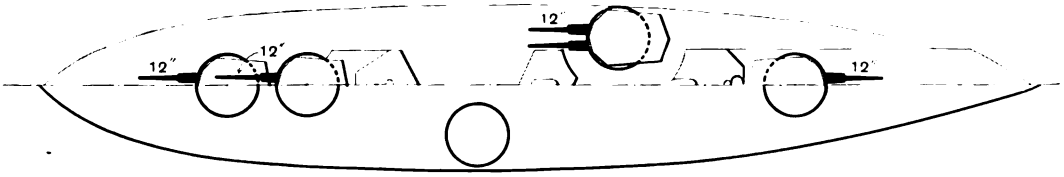
GREAT BRITAIN.

BATTLESHIPS.

Neptune. **Hercules.** **Colossus.**





Length, 510 ft.; 20,000 tons; Speed, 21 knots; Building;
Armament, 10—12 in., 16—4 in.

See page 206.

PLATE 1.

b 2

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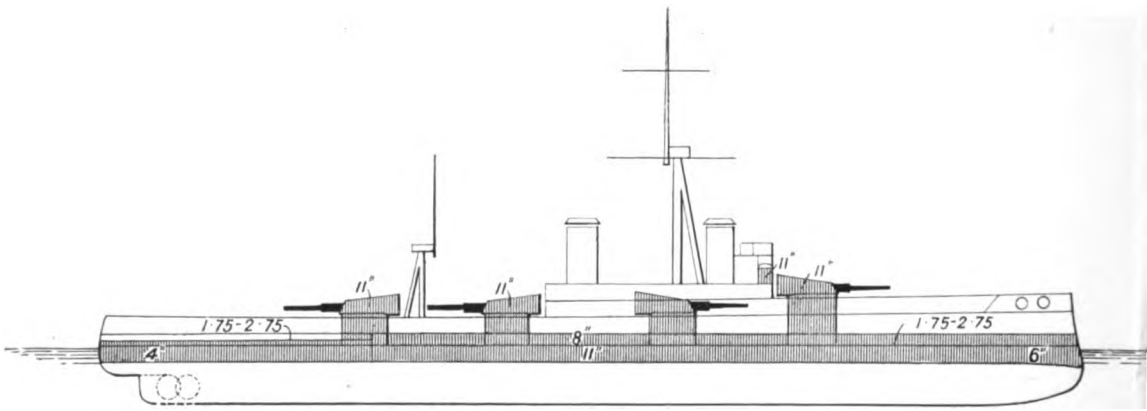
BATTLESHIPS.

Dreadnought. **Bellerophon.** **Temeraire** **Superb.** **Collingwood.**
St. Vincent. **Vanguard.**



Dreadnought.—Length, 490 ft. ; 17,900 tons ; Speed, 21·8 knots ; Completed, 1906 ;
Armament, 10—12 in., 24—12 pr.

Bellerophon
Temeraire
Superb —Length, 490 ft. ; 18,600 tons ; Speed, 21·6 knots ; Completed, 1909 ;
Armament, 10—12 in., 16—4 in.

Collingwood
St. Vincent
Vanguard —Length, 500 ft. ; 19,250 tons ; Speed, 21·5 knots ; Completed, 1910 ;
Armament, 10—12 in., 20—4 in.

N.B.—The masts are differently arranged in the later ships.

See page 204.

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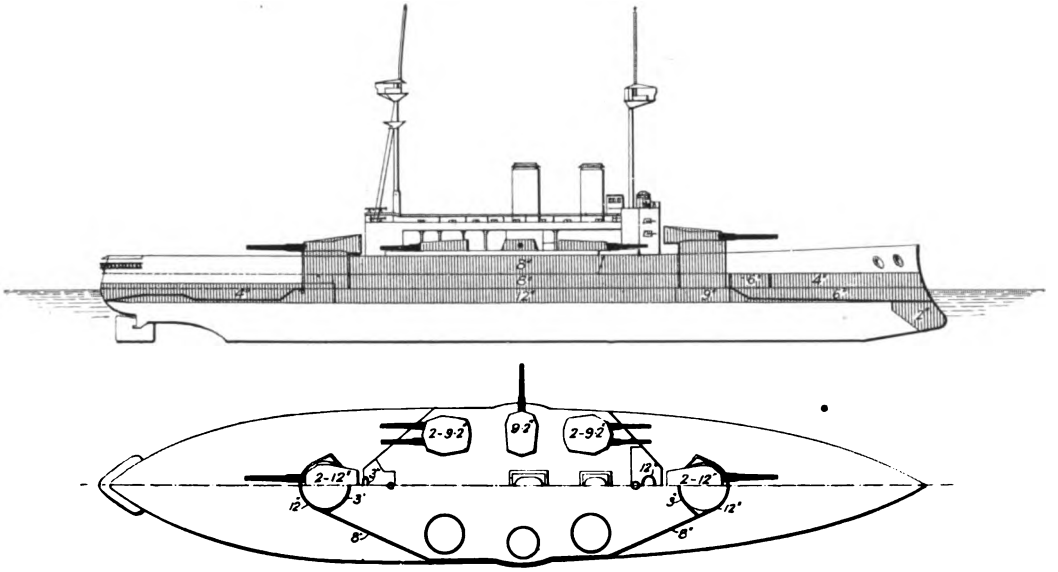
GREAT BRITAIN.

BATTLESHIPS.

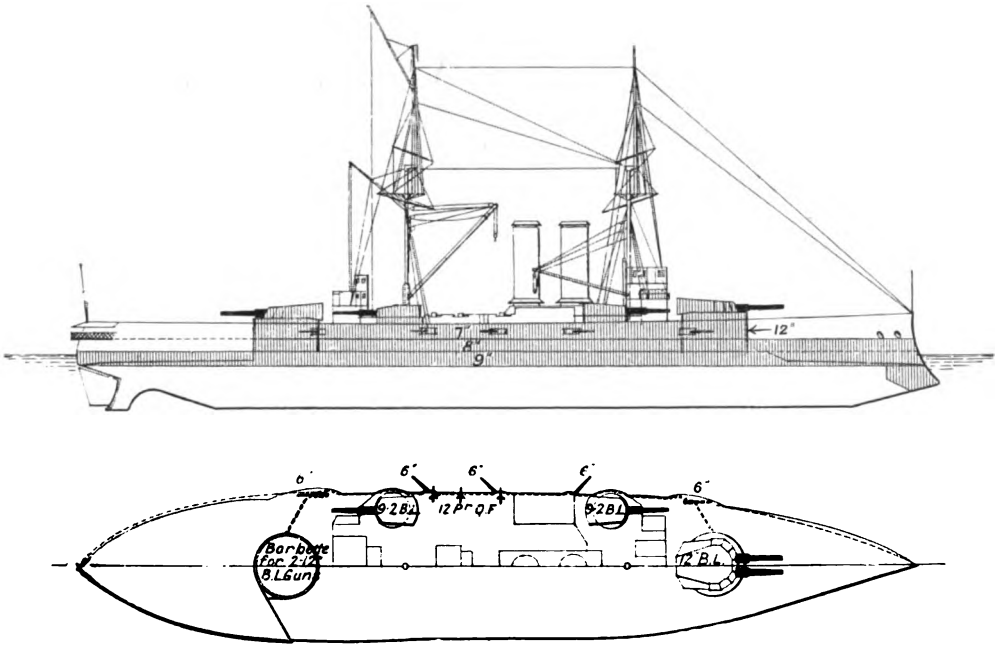
Lord Nelson. **Agamemnon.**



Length, 410 ft.; 16,500 tons; Speed, 18 knots; Completed, 1908;
Armament, 4—12 in., 10—9·2 in., 24—12 pr., 5 small.

See page 207.

King Edward VII. **Africa.** **Britannia.** **Commonwealth.** **Dominion.**
Hibernia. **Hindustan.** **New Zealand.**



Length, 425 ft.; 16,350 tons; Speed, 18·5—19·5 knots; Completed, 1905-1906;
Armament, 4—12 in., 4—9·2 in., 10—6 in., 14—12 pr., 17 small

See page 206.

PLATE 3.

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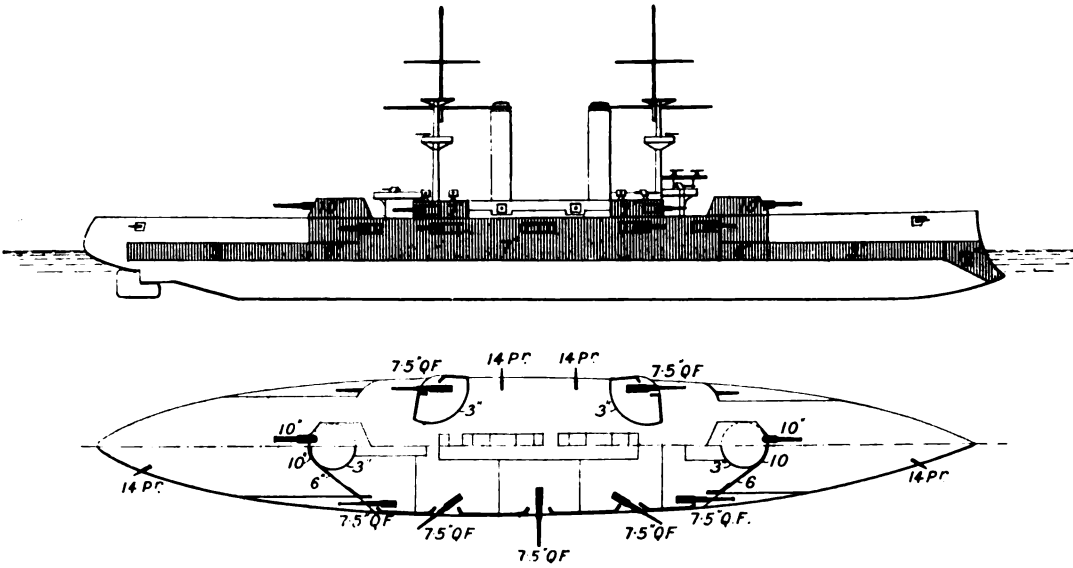
GREAT BRITAIN.

BATTLESHIPS.

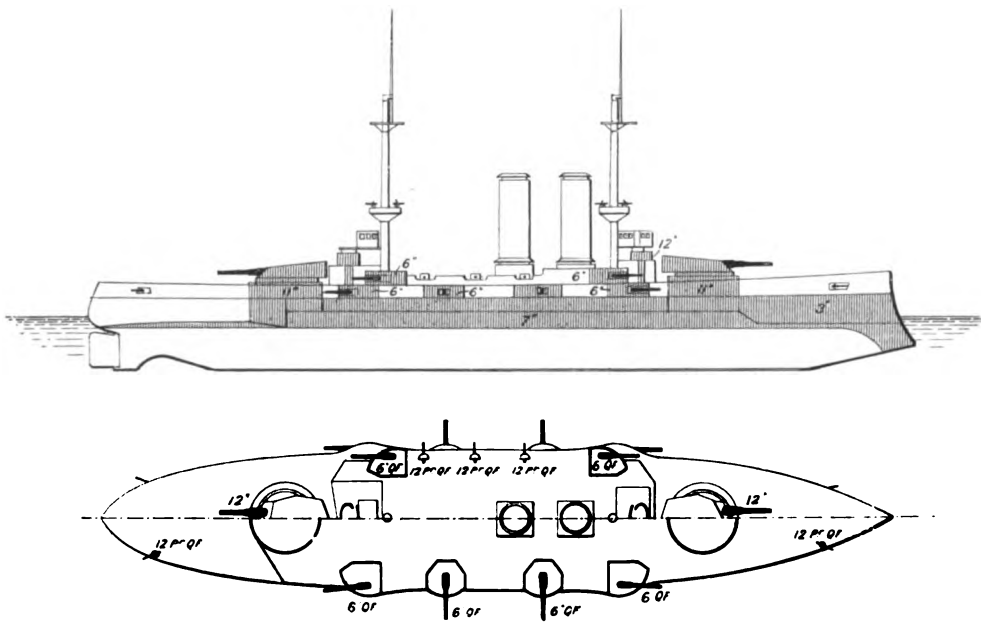
Triumph. **Swiftsure.**



Length, 436 ft. ; 11,800 tons ; Speed, 19·6 knots ; Completed, 1904 ;
Armament, 4—10 in., 14—7·5 in., 14—14 pr., 2—12 pr., 8 small.

See page 209.

Duncan. **Albemarle.** **Cornwallis.** **Exmouth.** **Russell.**



Length, 405 ft. ; 14,000 tons ; Speed, 18·6—19·3 knots ; Completed, 1903–1904 ;
Armament, 4—12 in., 12—6 in., 12—12 pr., 8 small.

See page 204.

Plate 4.

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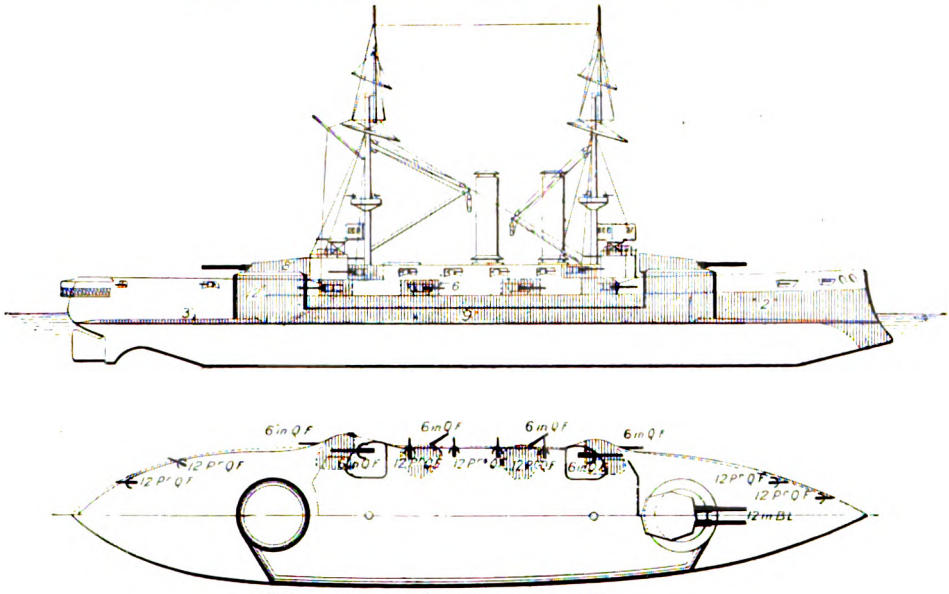
GREAT BRITAIN.

BATTLESHIPS.

Formidable. ***Bulwark.** ***Prince of Wales.** **Implacable.** ***Queen.** **Irresistible.** ***Venerable.** ***London.**

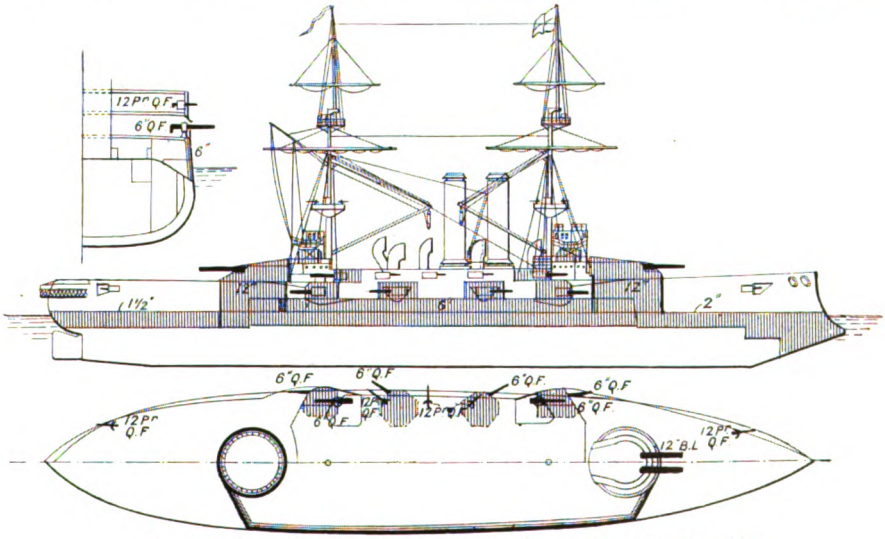


*In These Ships 9" Armour Tapers to 2" at 30 ft From Bow, & They Have no Forward Bulkhead

Length, 400 ft. ; 15,000 tons ; Speed, 18—18·3 knots ; Completed, 1901-1904 ;
Armament, 4—12 in., 12—6 in., 18—12 pr., 8 small.

See page 205.

Canopus. **Albion.** **Glory.** **Goliath.** **Ocean.** **Vengeance.**



Length, 390 ft. ; 12,950 tons ; Speed, 18·2—18·5 knots ; Completed, 1900-1902 ;
Armament, 4—12 in., 12—6 in., 12—12 pr., 8 small.

See page 203.

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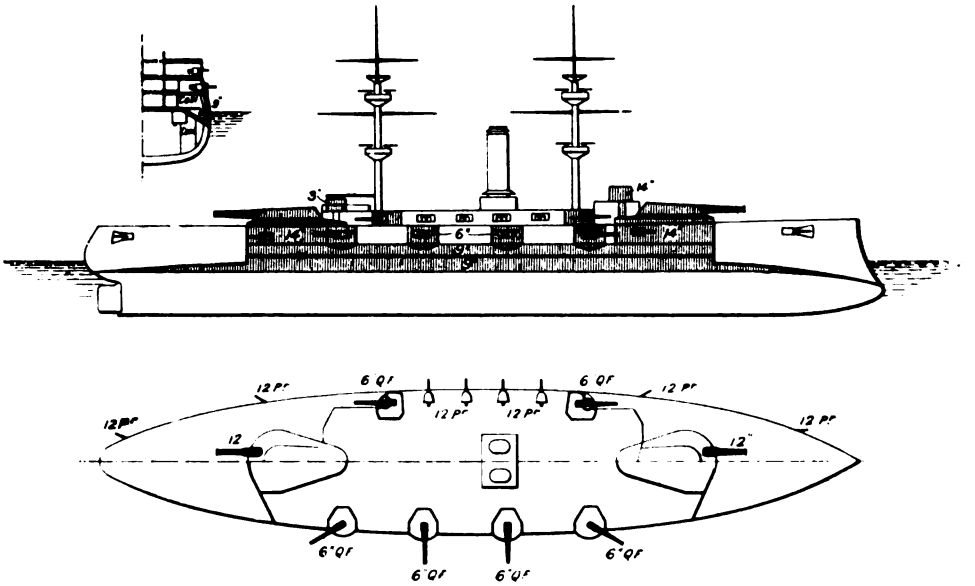
GREAT BRITAIN.

BATTLESHIPS.

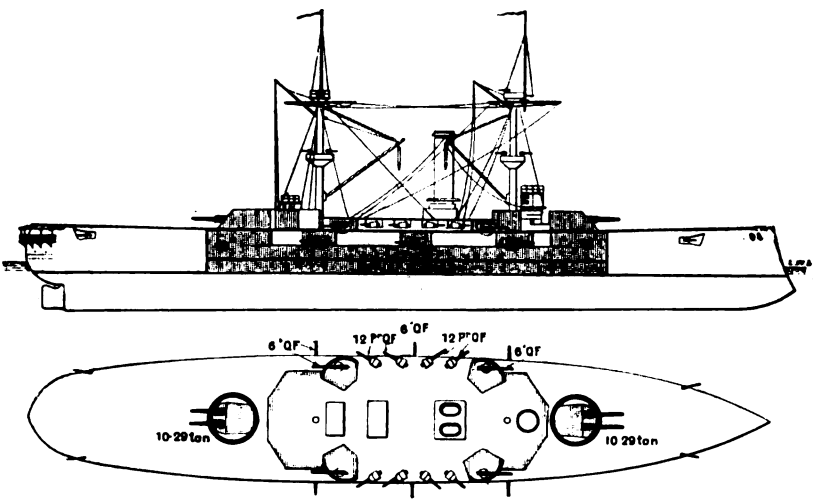
Majestic. **Cæsar.** **Hannibal.** **Illustrious.** **Jupiter.** **Magnificent.**
Mars. **Prince George.** **Victorious.**



Length, 390 ft. ; 14,900 tons ; Speed, 17·5 knots ; Completed, 1895–1898 ;
Armament, 4 12 in., 12—6 in., 18 - 12 pr., 10 small.

See page 207.

Renown.



Length, 380 ft. ; 12,350 tons ; Speed, 18 knots ; Completed, 1896 ;
Armament, 4 -10 in., 10 -6 in., 12—12 pr., 14 small.

See page 208.

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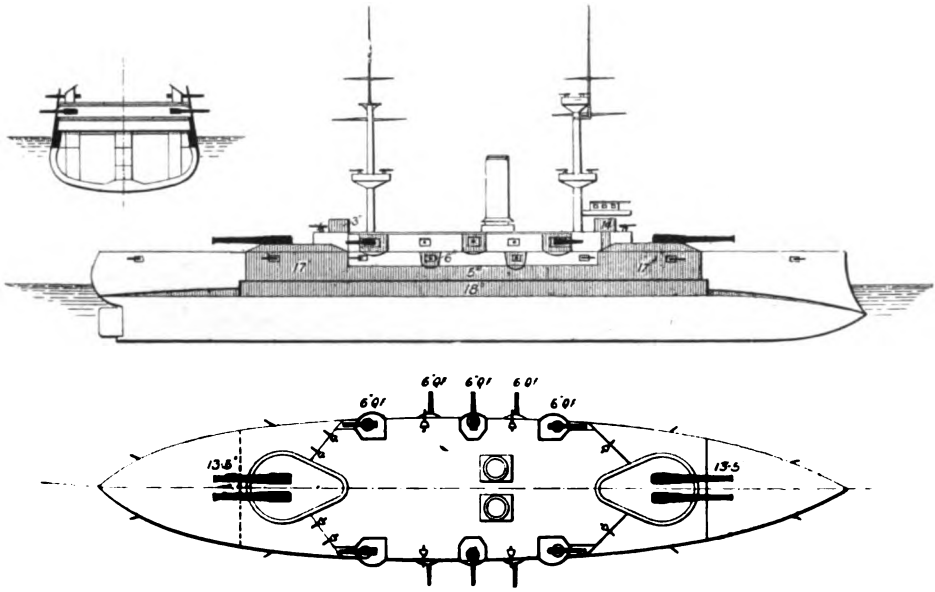
BATTLESHIPS.

Royal Sovereign. **Empress of India.** ***Hood.** **Ramillies.** **Repulse.**
Resolution. **Revenge.** **Royal Oak.**



* *The 13·5" guns are in turrets on the "Hood"*

Length, 380 ft. ; 14,150 tons ; Speed, 17·5-18 knots ; Completed, 1892-1895 ;
Armament, 4—13·5 in., 10—6 in., 32 small.

See page 208.

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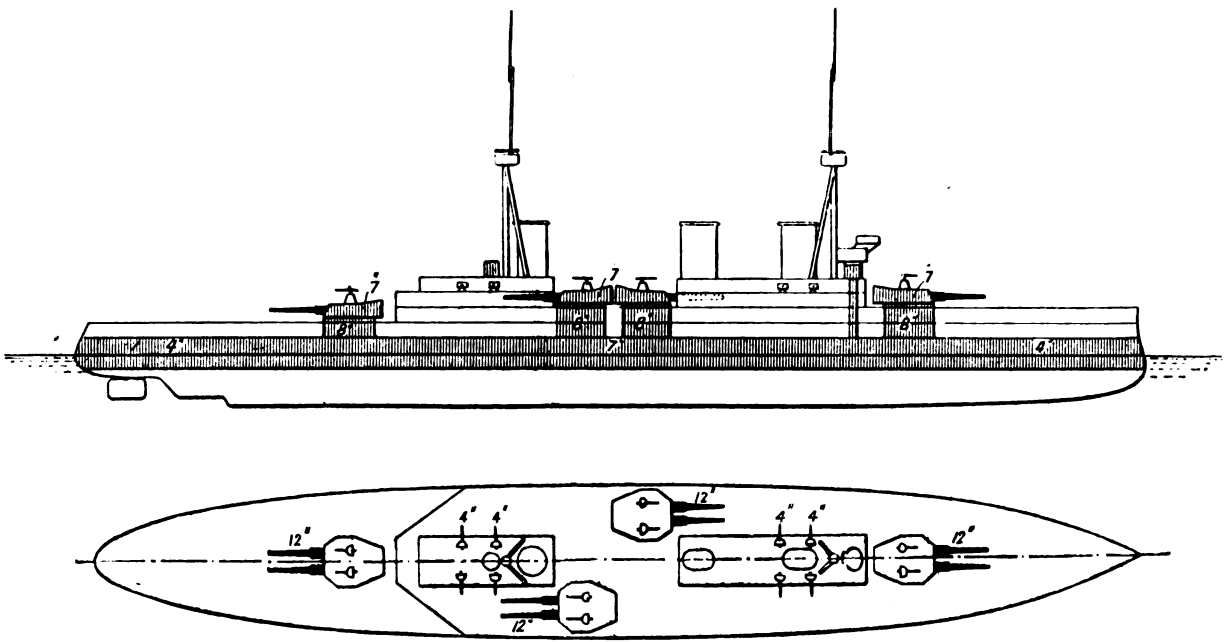
GREAT BRITAIN.

ARMOURED CRUISERS.

Invincible. **Indomitable.** **Inflexible.** **Indefatigable.***



Invincible
Indomitable
Inflexible } Length, 530 ft. ; 17,250 tons ; Speed, 26 knots ; Completed, 1908–9 ; Armament, 8—12 in., 16—4 in.

* **Indefatigable** : Length, 555 ft. ; 18,750 tons ; Speed, 25 knots ; Building ; Armament, 8—12 in., 16—4 in.

* The centre turrets are more *en échelon* than in the three earlier ships.

See page 206.

PLATE 8

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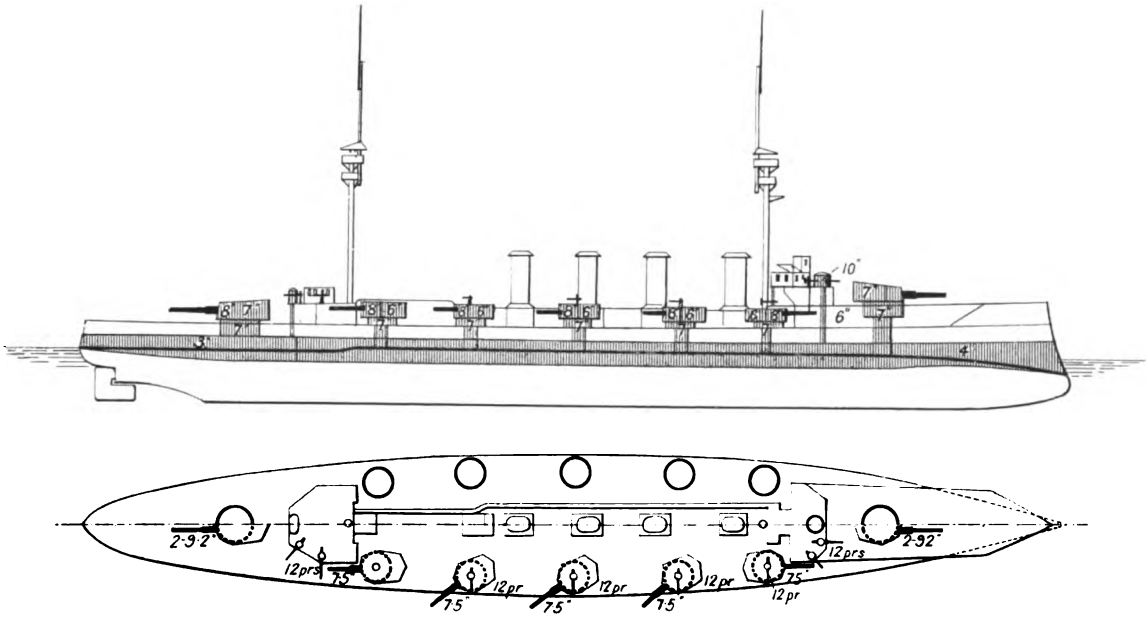
GREAT BRITAIN.

ARMOURED CRUISERS.

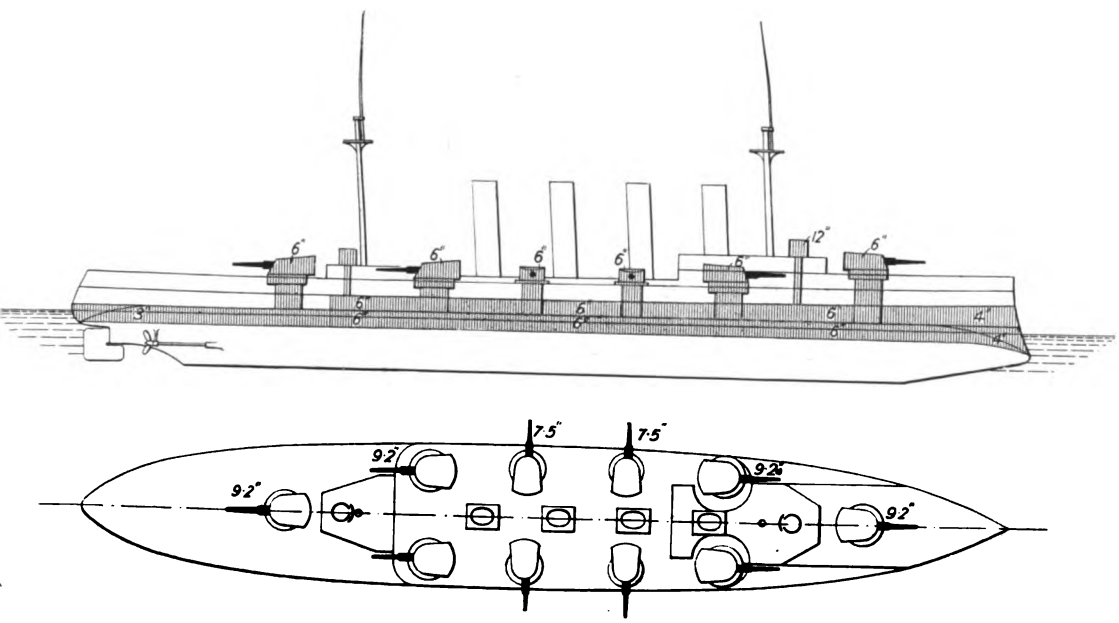
Defence. **Minotaur.** **Shannon.**



Length, 490 ft. ; 14,600 tons ; Speed, 22·5–23·5 knots ; Completed, 1907–1908 ;
Armament, 4—9·2 in., 10—7·5 in., 16—12 pr., 5 small.

See page 204.

Achilles. **Cochrane.** **Natal.** **Warrior.**



Length, 480 ft. ; 13,550 tons ; Speed, 22·3–23·3 knots ; Completed, 1906–1907 ;
Armament, 6—9·2 in., 4—7·5 in., 1—12 pr., 31 small.

See page 202.

PLATE 9.

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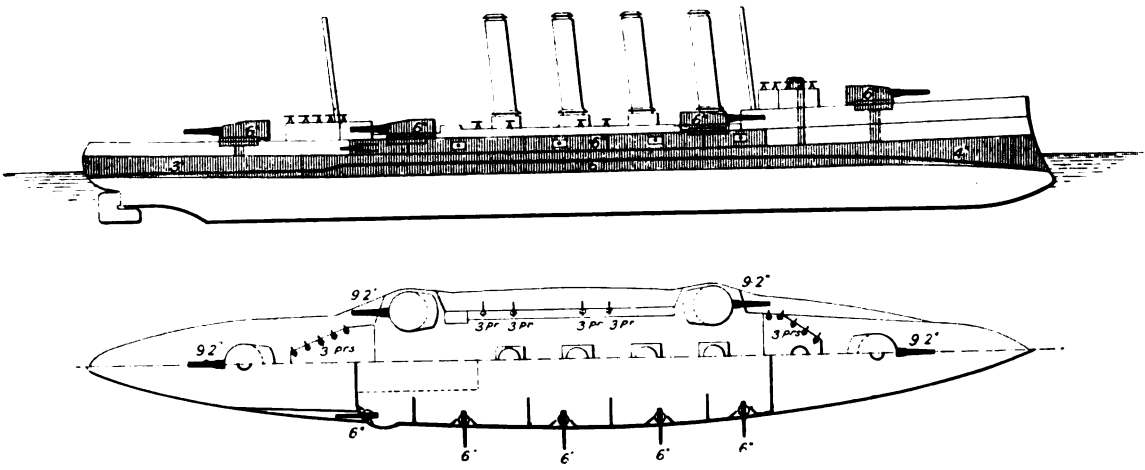
GREAT BRITAIN.

ARMOURED CRUISERS.

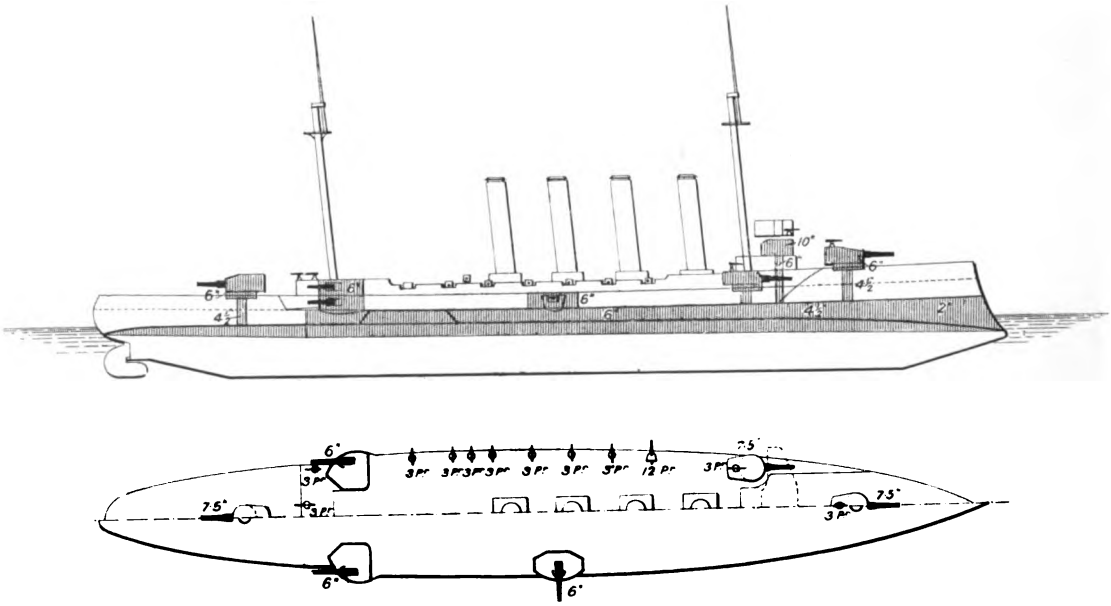
Black Prince. **Duke of Edinburgh.**



Length, 480 ft. ; 13,550 tons ; Speed, 22·8–23·6 knots ; Completed, 1906 ;
Armament, 6–9·2 in., 10 –6 in., 2—12 pr., 27 small.

See page 203.

Devonshire. **Antrim.** **Argyll.** **Carnarvon.** **Hampshire.** **Roxburgh.**



Length, 450 ft. ; 10,850 tons ; Speed, 22·2–23·6 knots ; Completed, 1905–1906 ;
Armament, 4—7·5 in., 6—6 in., 1—12 pr., 24 small.

See page 204.

PLATE 10.

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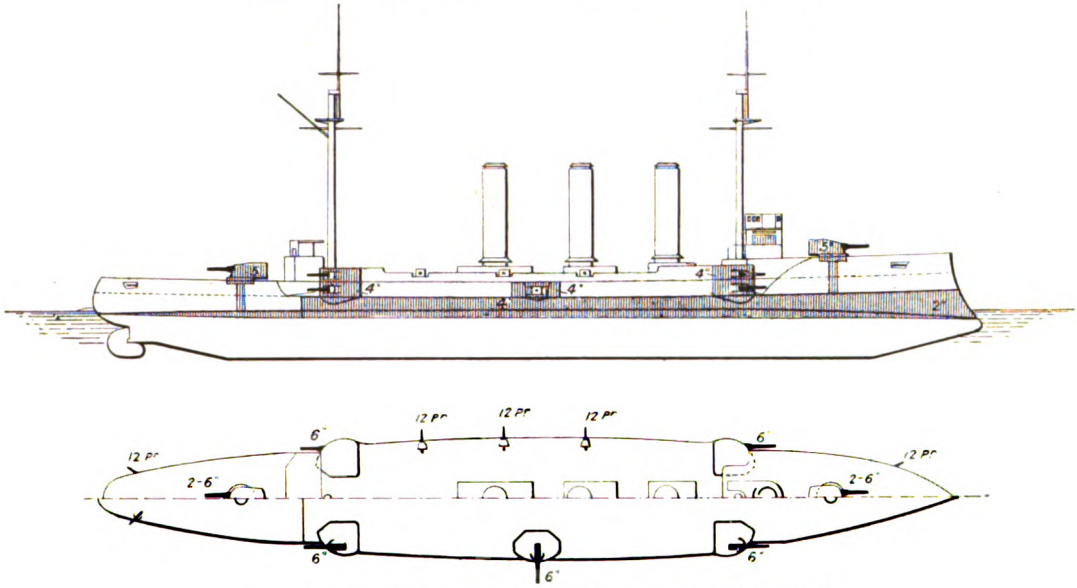
GREAT BRITAIN.

ARMOURED CRUISERS.

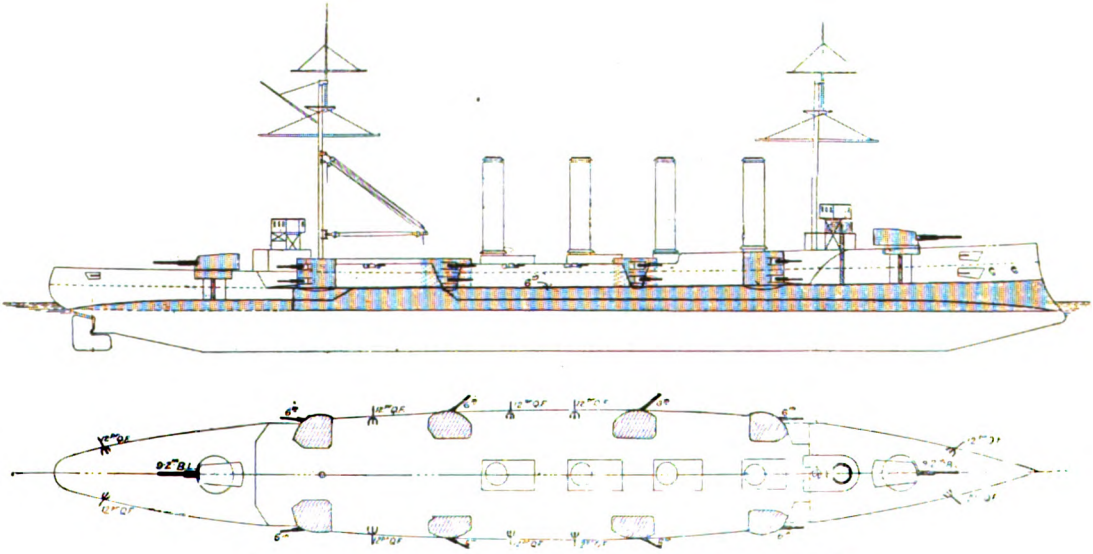
Bedford. Berwick. Cornwall. Cumberland. Donegal. Essex.
Kent. Lancaster. Monmouth. Suffolk.



Length, 440 ft. ; 9,800 tons ; Speed, 22·7–24·7 knots ; Completed, 1903–1905 ;
Armament, 14—6 in., 10—12 pr., 9 small.

See page 202.

Drake. Good Hope. King Alfred. Leviathan.



Length, 500 ft. ; 14,100 tons ; Speed, 23·3–24·1 knots. ; Completed, 1902–1903 ;
Armament, 2–9·2 in., 16—6 in., 12—12 pr., 7 small.

See page 204.

PLATE 11.

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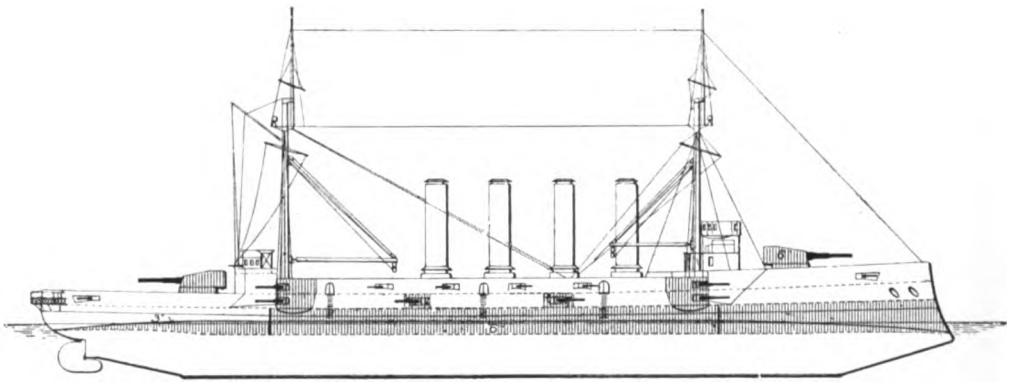
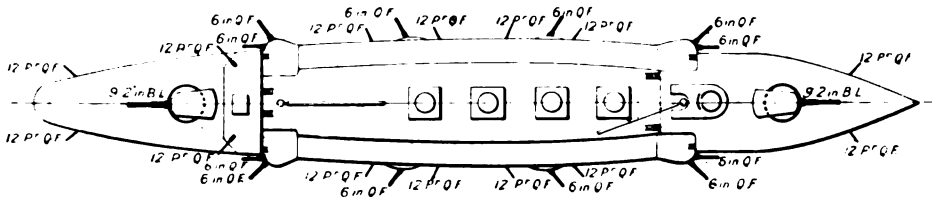
ARMOURED CRUISERS.

Cressy. **Aboukir.** **Bacchante.** **Euryalus.** **Hogue.** **Sutlej.**





Length, 440 ft. ; 12,000 tons ; Speed, 20·8—21·8 knots ; Completed, 1901-1904 ;
Armament, 2—9·2 in., 12—6 in., 14—12 pr., 15 small.

See page 204.

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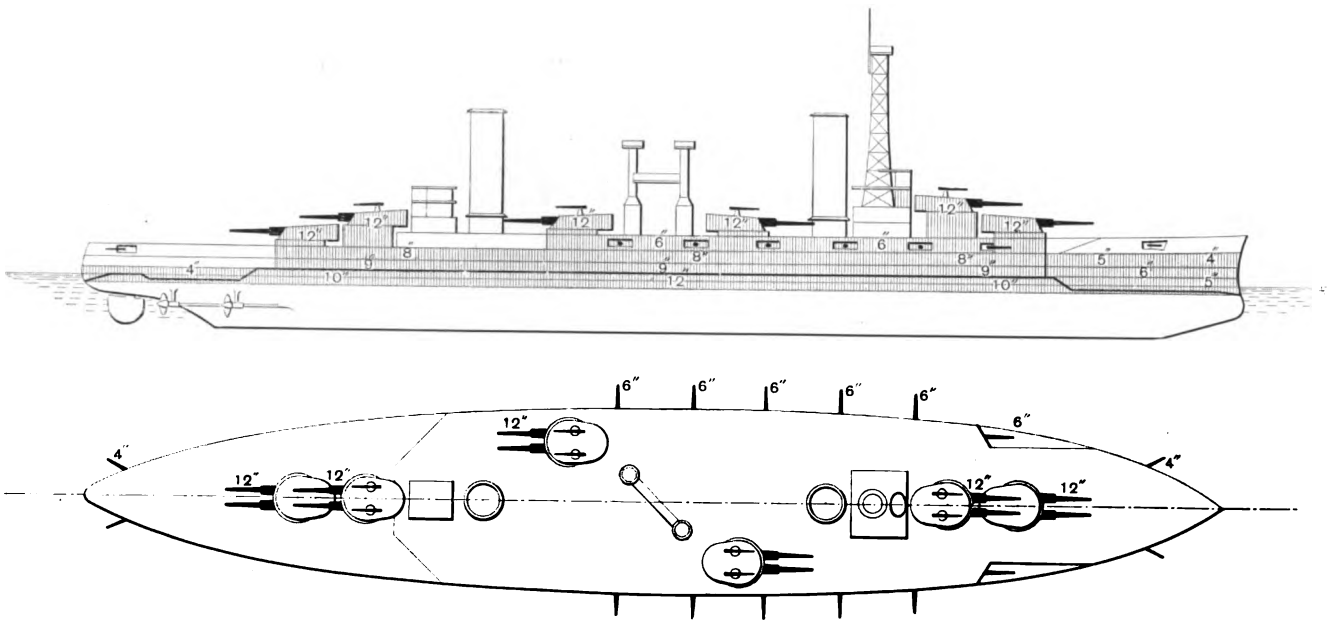
ARGENTINE.

BATTLESHIPS.

Moreno. **Rivadavia.**



Length, 578 ft. ; 28,000 tons ; Speed, 22·5 knots ; Building ;
Armament, 12—12 in., 12—6 in., 12—4 in.

See page 218.

PLATE 13.

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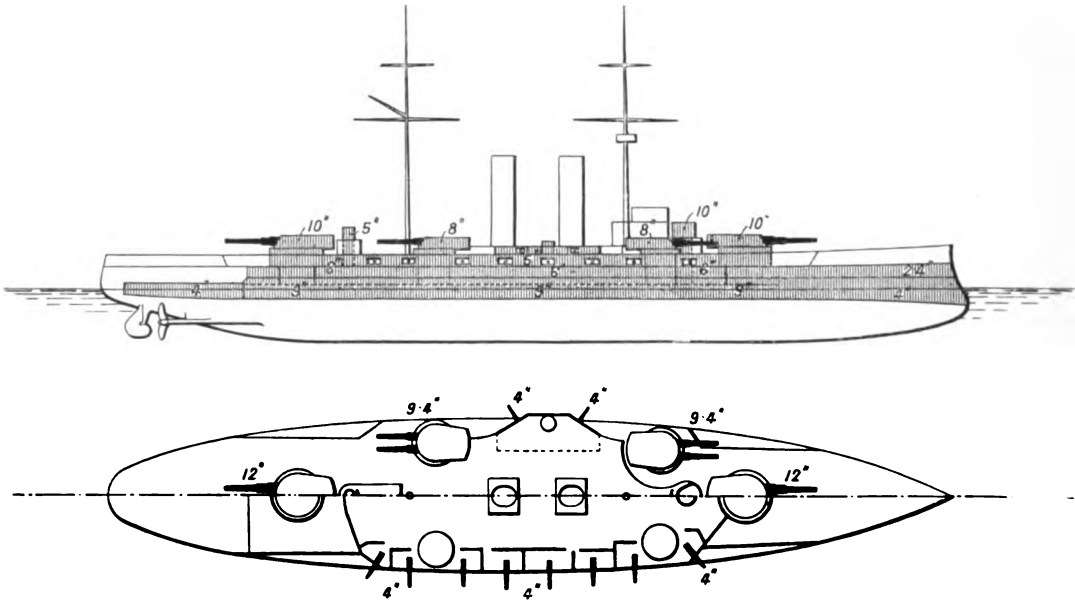
AUSTRIA.

BATTLESHIPS.

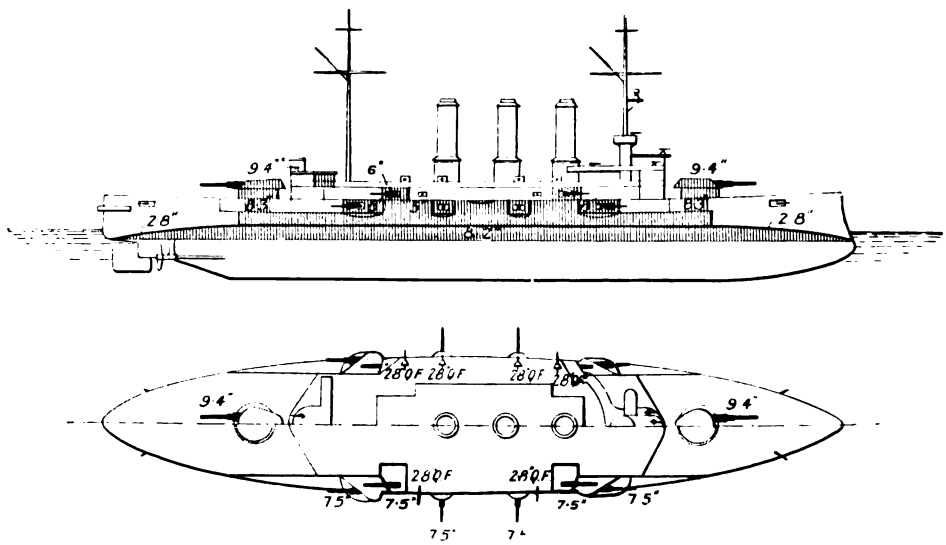
Erzherzog Franz Ferdinand. Radetzky. Zrinyi.



Length, 451 ft. ; 14,226 tons ; Speed, 20·5 knots ; Building ;
Armament, 4–12 in., 8–9·4 in., 20–4 in., 6–12 pr., 2 small.

See page 220.

Erzherzog Ferdinand Max. Erzherzog Karl. Erzherzog Friedrich.



Length, 330 ft. ; 10,433 tons ; Speed, 20–20·6 knots ; Completed, 1906–1907 ;
Armament, 4–9·4 in., 12–7·5 in., 12–12 pr., 16 small.

See page 220.

PLATE 14.

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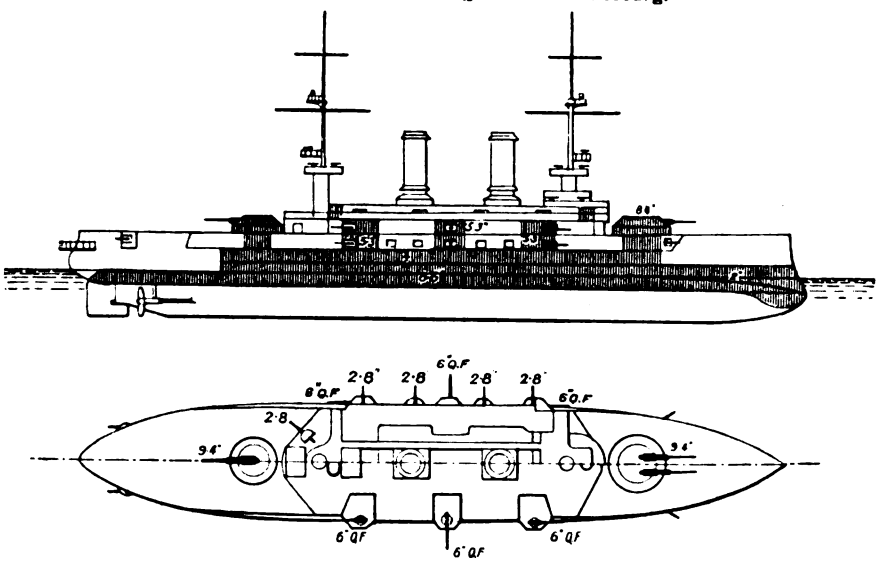
AUSTRIA.

BATTLESHIPS.

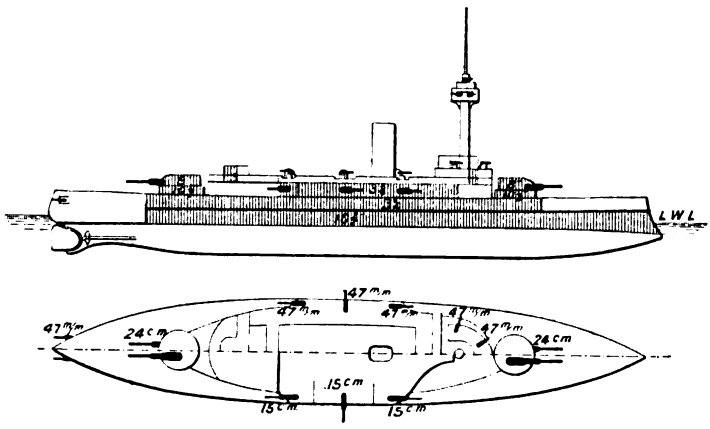
Arpad. **Babenberg.** **Habsburg.**



Length, 354 ft. ; 8208 tons ; Speed, 19·6 knots ; Completed, 1902–1904 ;
Armament, 3–9·4 in., 12–6 in., 10—12 pr., 10 small.

See page 220.

Budapest. **Monarch.** **Wien.**



Length, 305 ft. ; 5462–5550 tons ; Speed, 17·5 knots ; Completed, 1897–1898 ;
Armament, 4—9·4 in., 6—5·9 in., 20 small.

See page 220.

PLATE 15.

C

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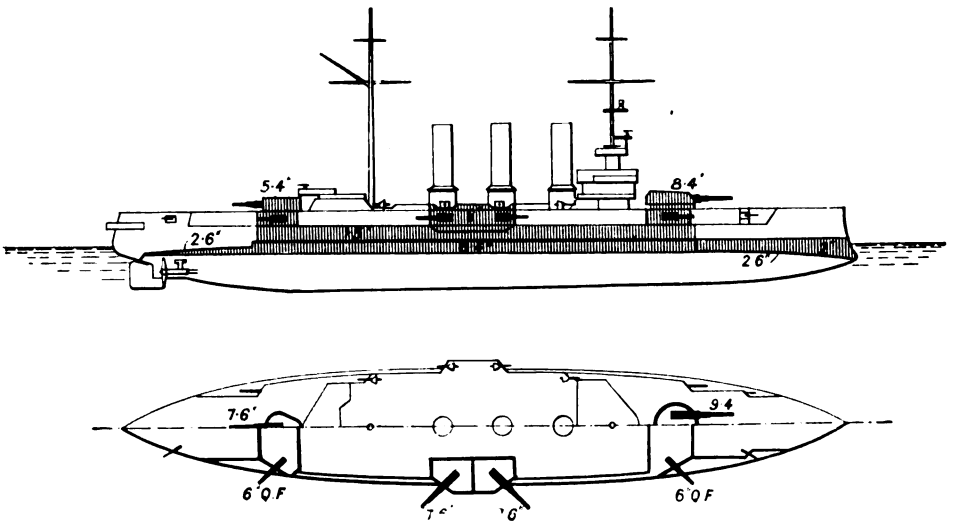
AUSTRIA.

ARMOURED CRUISERS.

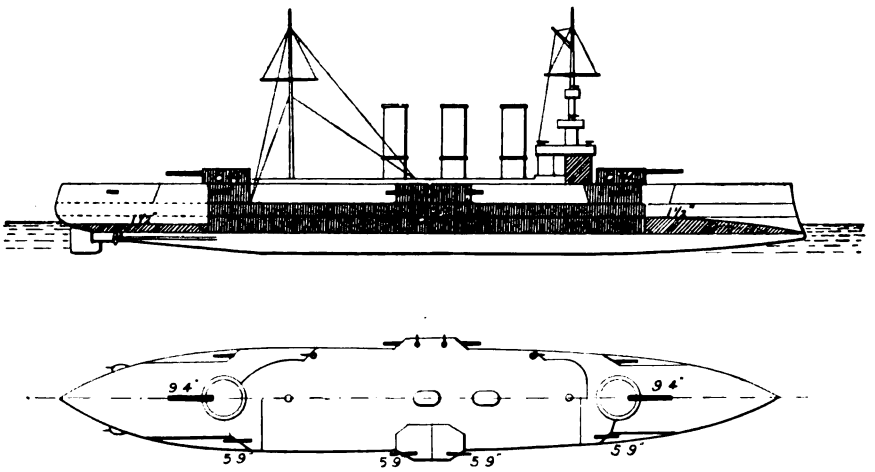
St. Georg.



Length, 384 ft. ; 7185 tons ; Speed, 22 knots ; Completed, 1906 ;
Armament, 2—9·4 in., 5—7·6 in., 4—6 in., 9—12 pr., 16 small.

See page 220.

Kaiser Karl VI.



Length, 367 ft. ; 6151 tons ; Speed, 20·7 knots ; Completed, 1900 ;
Armament, 2—9·4 in., 8—5·9 in., 22 small.

See page 220.

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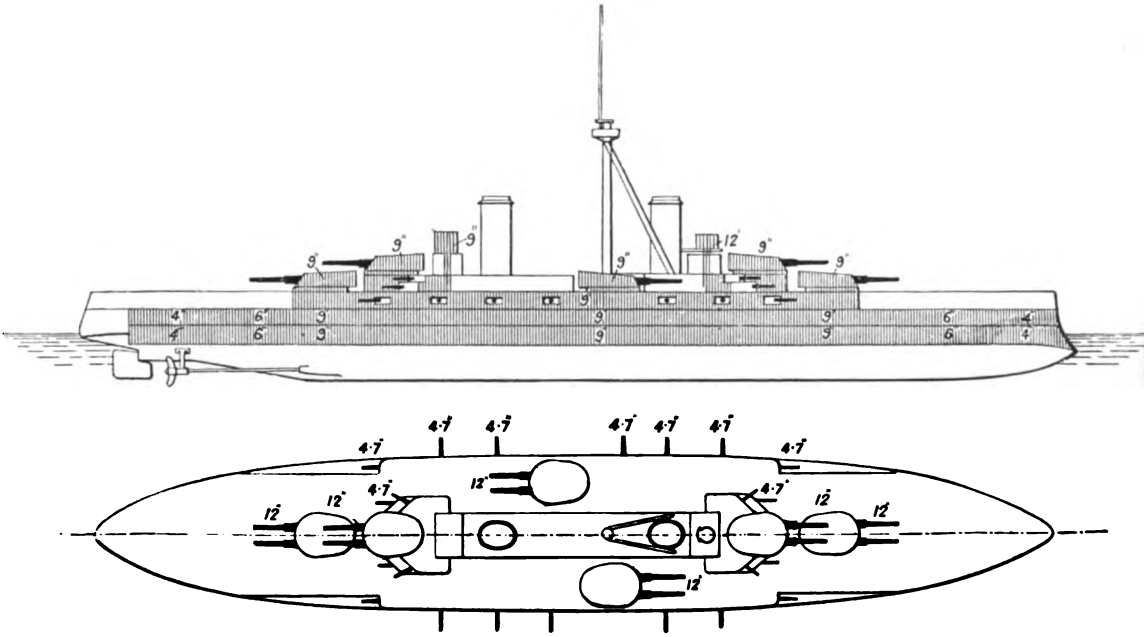
BRAZIL.

BATTLESHIPS.

Minas Geraes. **Rio de Janeiro.** **Sao Paulo.**



Length, 500 ft. ; 19,281 tons ; Speed, 21 knots ;
Minas Geraes, completed 1909 ; Sao Paulo, completed 1910 ; Rio de Janeiro, Building ;
Armament, 12—12 in., 22—4·7 in., 8 small.

See page 222.

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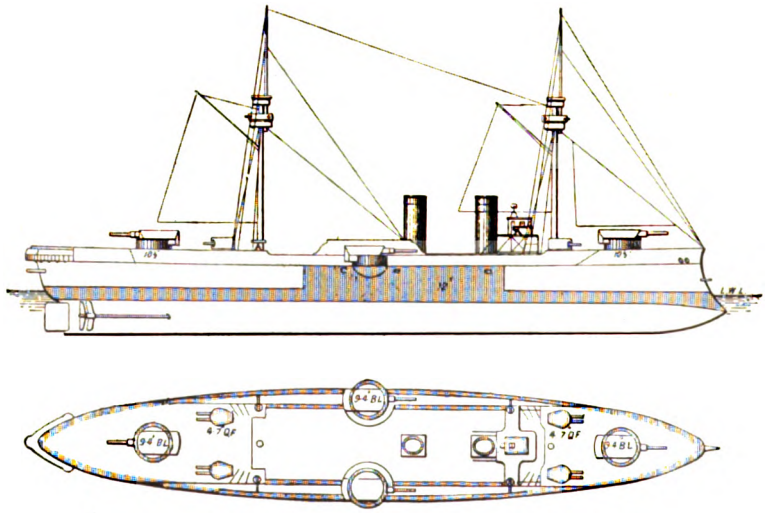
CHILI.

BATTLESHIP.

Capitão Prat.

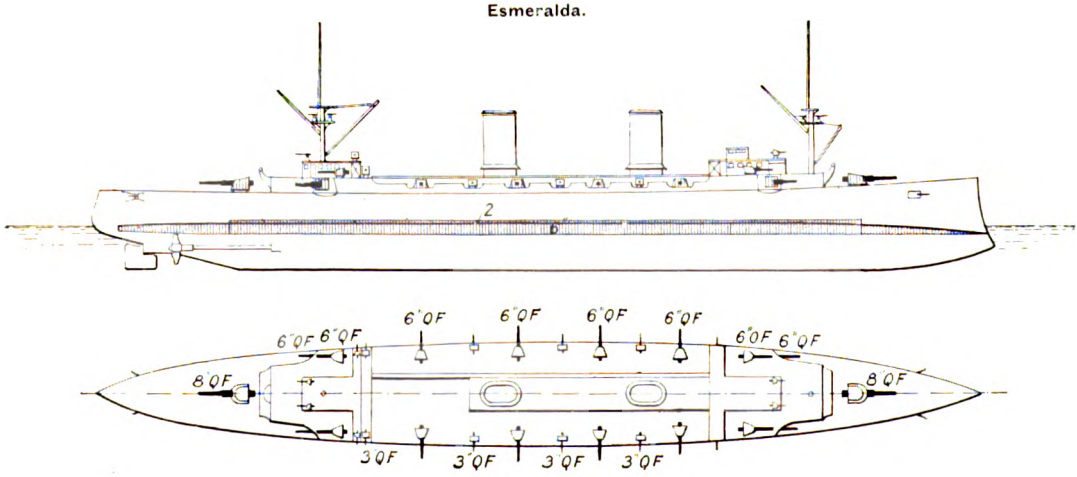


Length, 328 ft. ; 5981 tons ; Speed, 18·3 knots ; Completed, 1893 ;
Armament, 4—9·4 in., 8—4·7 in., 25 small.

See page 224.

ARMOURED CRUISER.

Esmeralda.



Length, 436 ft. ; 7020 tons ; Speed, 22·8 knots ; Completed, 1897 ;
Armament, 2—8 in., 16—6 in., 8—12 pr., 6 small.

See page 224.

PLATE 18.

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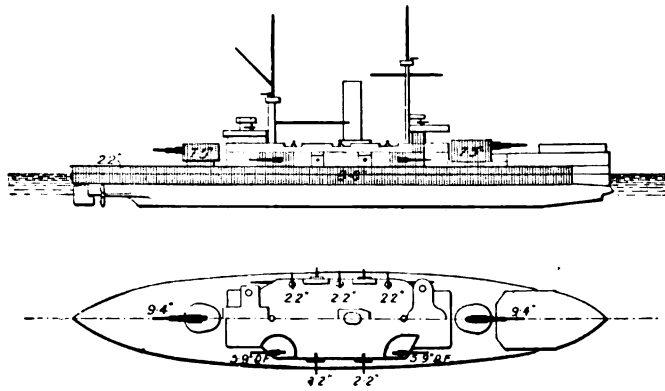
DENMARK.

COAST DEFENCE SHIPS.

Herluf Trolle. **Olfert Fischer.** **Peder Skram.**



Length, 271–274 ft.; 3415–3543 tons; Speed, 16–16·5 knots; Completed, 1901–1910; Armament, 2—9·4 in., 4—5·9 in., 18 small.

See page 226.

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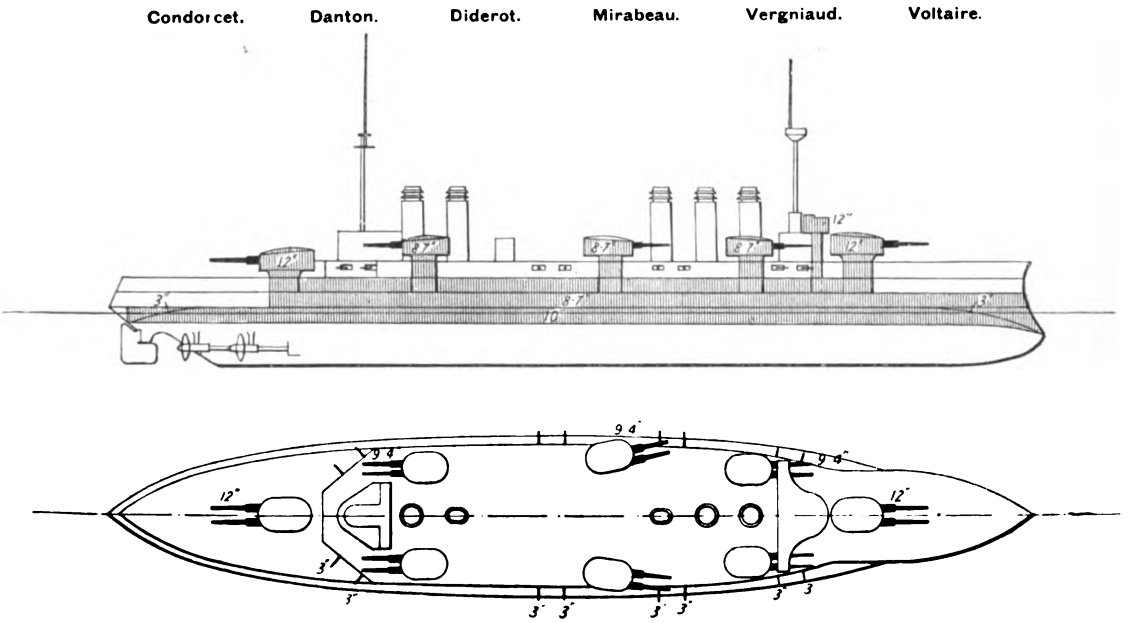
FRANCE.

BATTLESHIPS.

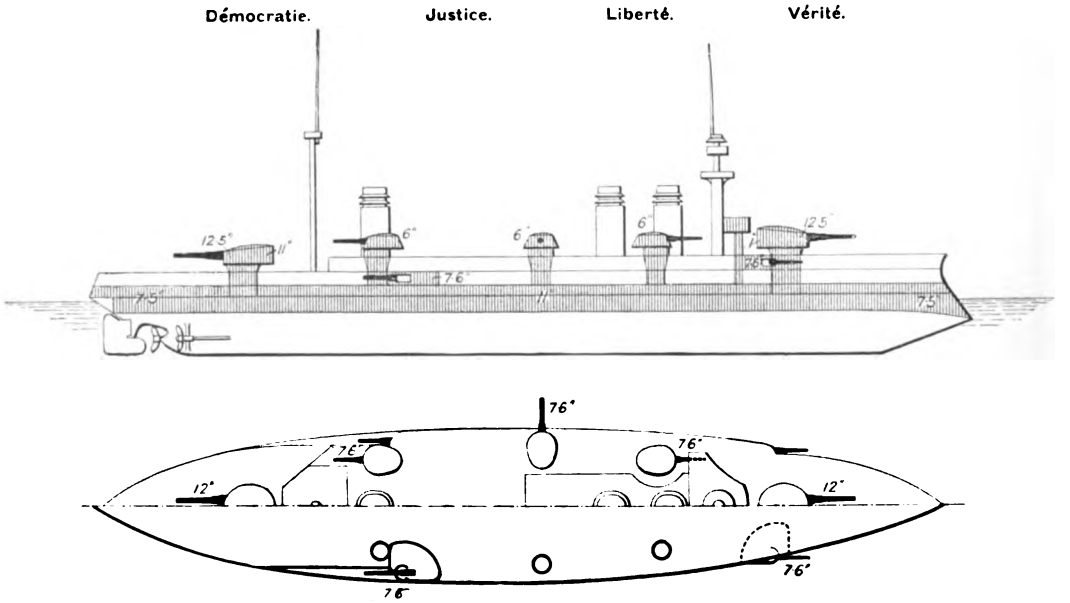
Condorcet. **Danton.** **Diderot.** **Mirabeau.** **Vergniaud.** **Voltaire.**



Length, 476 ft. ; 17 710 tons ; Speed, 19 knots ; Building ;
Armament, 4—12 in., 12—9·4 in., 16—12 pr., 10 small.

See page 227.

Démocratie. **Justice.** **Liberté.** **Vérité.**



Length, 439 ft ; 14,635 tons ; Speed, 19·3 knots ; Completed, 1907–1908 ;
Armament, 4—12 in., 16—7·6 in., 28 small.

See page 227.

PLATE 20.

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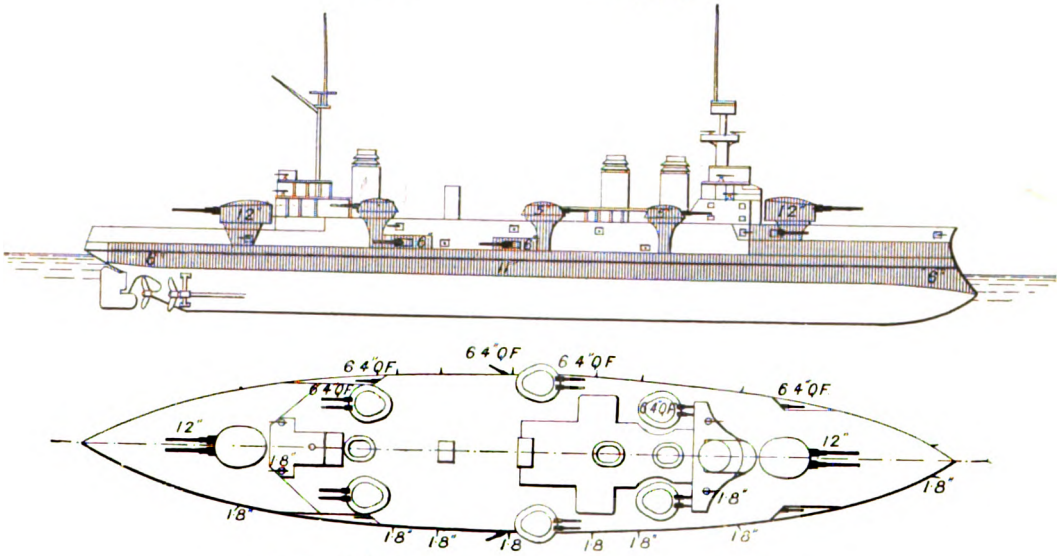
FRANCE.

BATTLESHIPS.

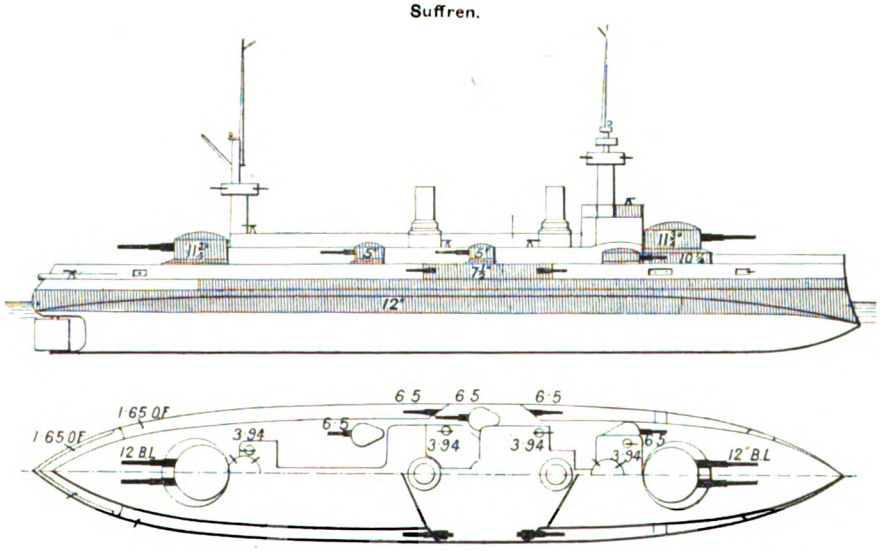
Patrie. République.



Length, 439 ft. ; 14,635 tons ; Speed, 19·1 knots ; Completed, 1906 ;
Armament, 4—12 in., 18 - 6·4 in., 28 small.

See page 229.

Suffren.



Length, 412 ft. ; 12,527 tons ; Speed, 18 knots ; Completed, 1903 ;
Armament, 4—12 in., 10—6·5 in., 8—3·9 in., 22 small.

See page 230.

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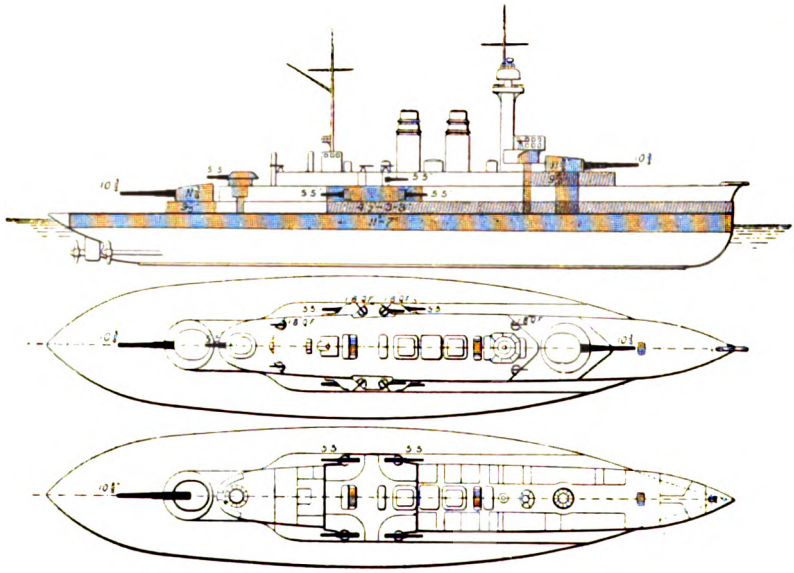
FRANCE.

BATTLESHIPS.

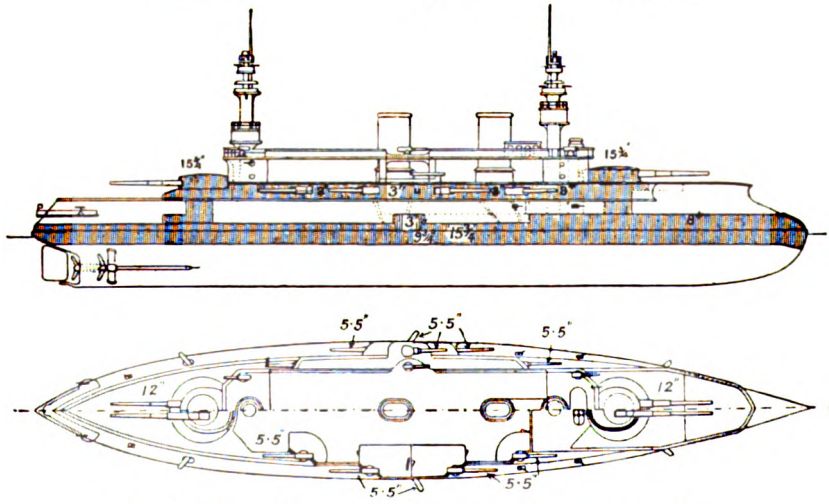
Henri IV.



Length, 354 ft. ; 8807 tons ; Speed, 17·2 knots ; Completed, 1903 ;
Armament, 2—10·8 in., 7—5·5 in., 14 small.

See page 228.

Charlemagne. Gaulois. St. Louis.



Length, 385 ft. ; 11,198 tons ; Speed, 18 knots ; Completed, 1898–1900 ;
Armament, 4—12 in., 10—5·5 in., 8—3·9 in., 34 small.

See page 227.

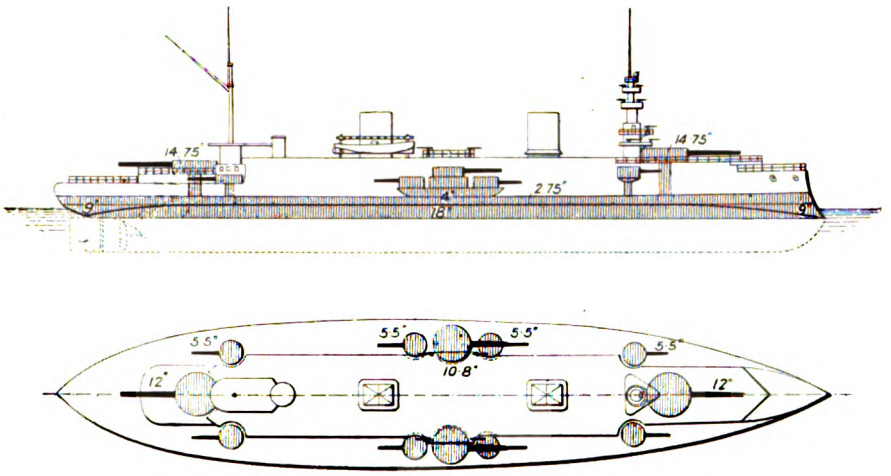
PLATE 22.

Digitized by Google

FRANCE.

BATTLESHIPS.

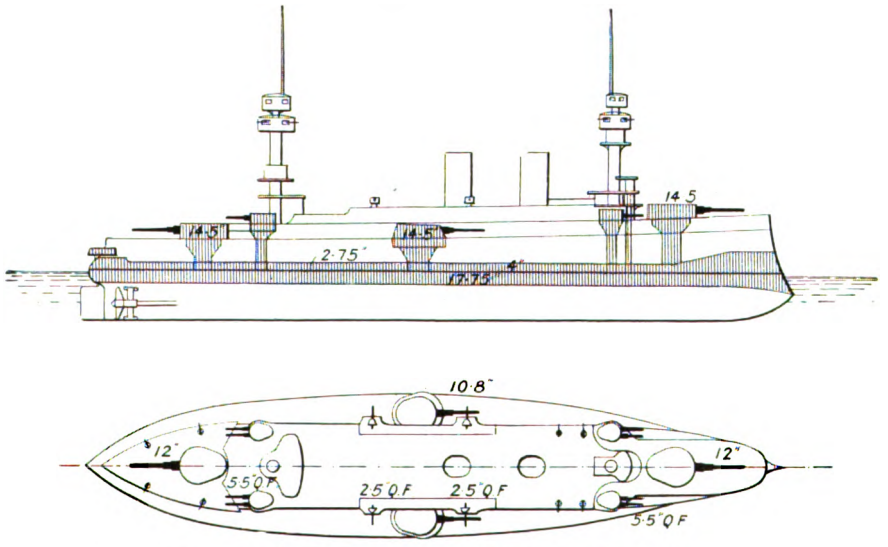
Carnot.



Length, 382 ft. ; 11,954 tons ; Speed, 17·8 knots ; Completed, 1896 ;
Armament, 2—12 in., 2—10·8 in., 8—5·5 in., 30 small.

See page 227.

Jauréguiberry.



Length, 364 ft. ; 11,637 tons ; Speed, 18 knots ; Completed, 1896 ;
Armament, 2—12 in., 2—10·8 in., 8—5·5 in., 32 small.

See page 228.

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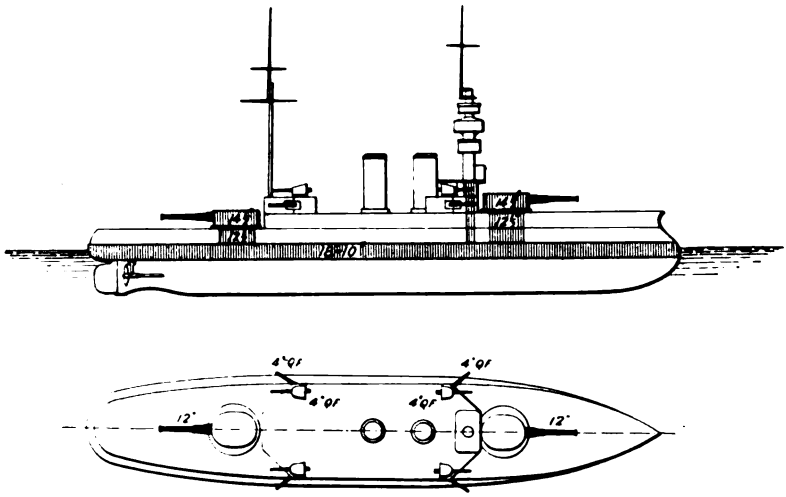
FRANCE.

BATTLESHIPS.

Bouvines. ***Tréhouart.**

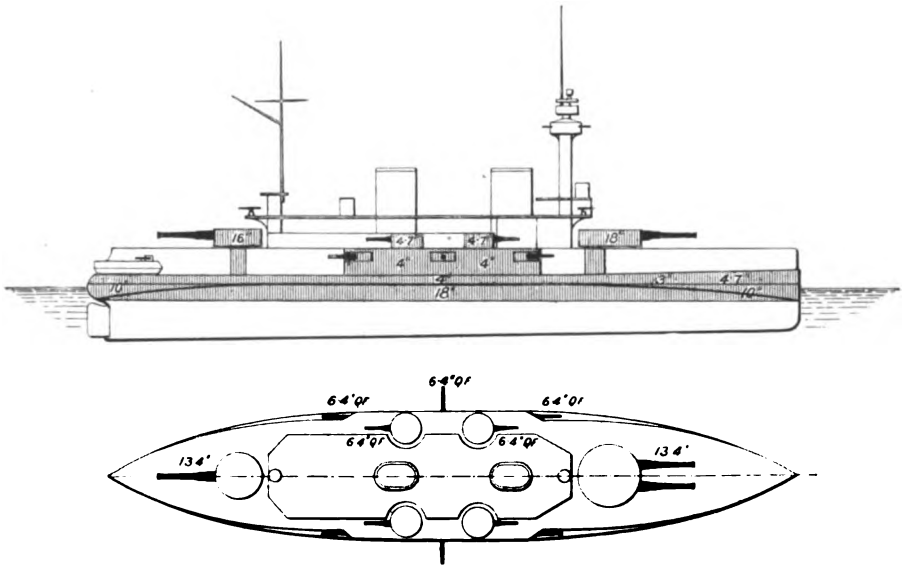


* The "Tréhouart" has but one funnel

Length, 294 ft. ; 6671–6691 tons ; Speed, 15·7—16 knots ; Completed, 1894–1896 ; Armament, 2—12 in., 8 4 in., 14 small.

See page 227.

Brennus.



Length, 361 ft. ; 11,190 tons ; Speed, 17·1 knots ; Completed 1895 ; Armament, 3—13·4 in., 10—6·4 in., 23 small.

See page 227.

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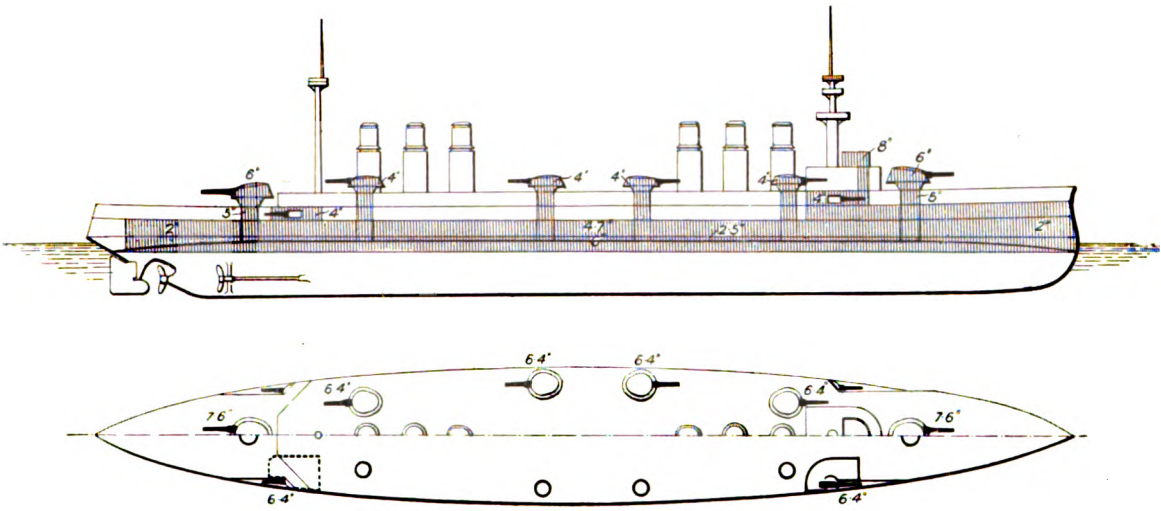
FRANCE.

ARMOURED CRUISERS.

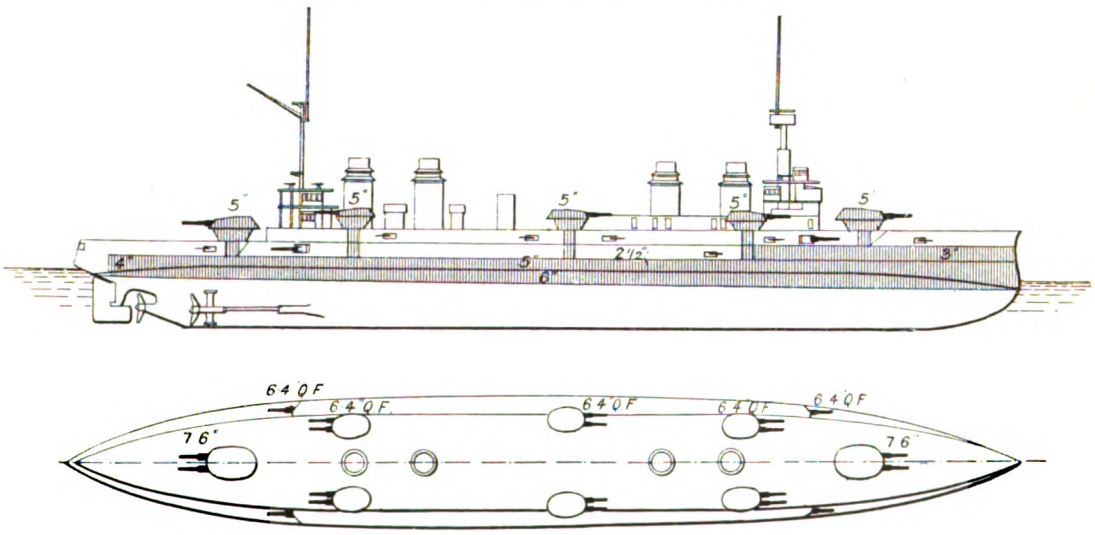
Ernest Renan.



Length, 515 ft. ; 13,427 tons ; Speed, 24·2 knots ; Completed, 1909 ;
Armament, 4—7·6 in., 16—6·4 in., 24 small.

See page 223.

Jules Ferry. Léon Gambetta. Victor Hugo.



Length, 480 ft. ; 12,351 tons ; Speed, 22·5–23 knots ; Completed, 1904–1906 ;
Armament, 4—7·6 in., 16—6·4 in., 24 small.

See page 229.

PLATE 25.

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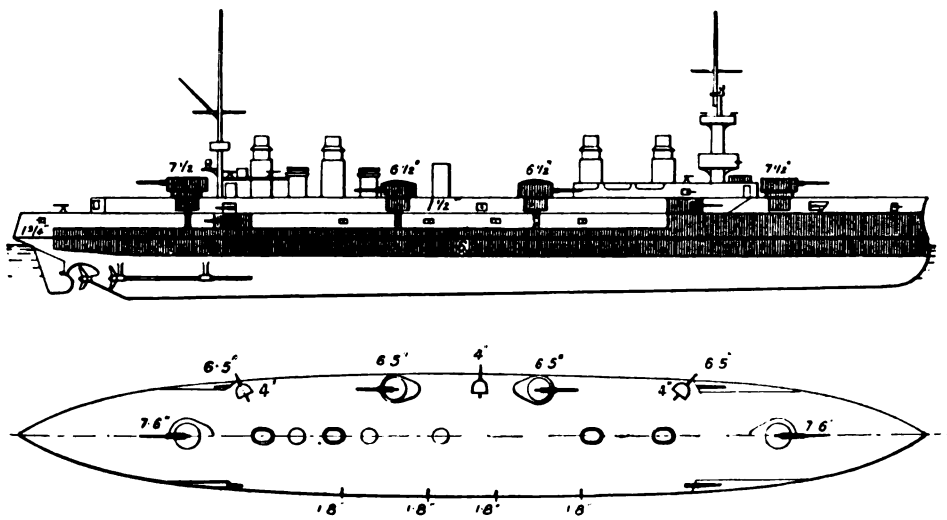
FRANCE.

ARMOURED CRUISERS.

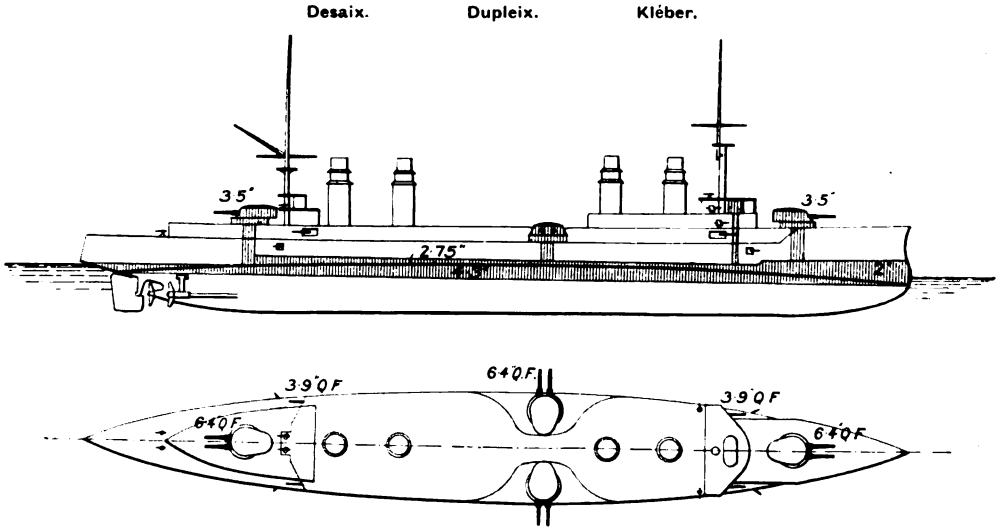
Aube. **Condé.** **Gloire.** **Marseillaise.**



Length, 453 ft. ; 9856 tons ; Speed, 21-21·9 knots ; Completed, 1903-1904 ;
Armament, 2—7·6 in., 8—6·4 in., 6—4 in., 20 small.

See page 227.

Desaix. **Dupleix.** **Kléber.**



Length, 426 ft. ; 7578 tons ; Speed, 21-21·7 knots ; Completed, 1903 ;
Armament, 8—6·4 in., 4—3·9 in., 14 small.

See page 223.

PLATE 26.

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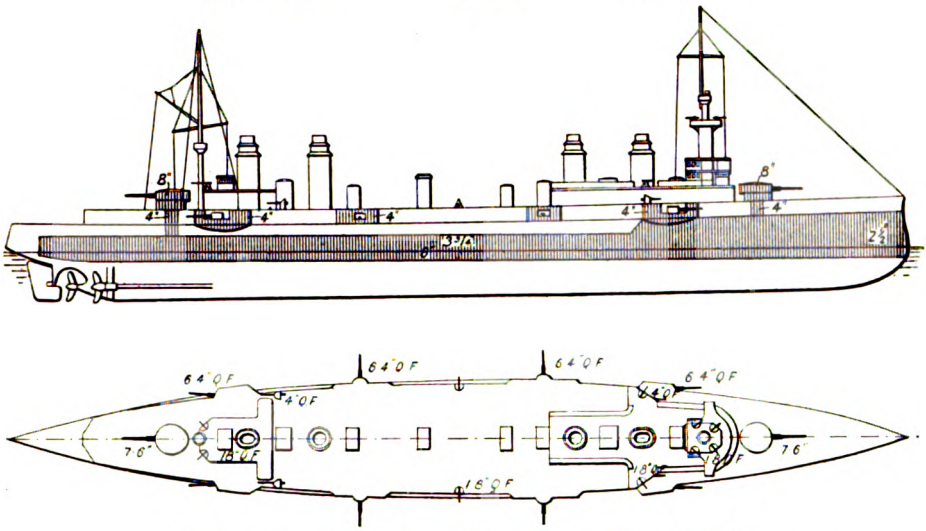
FRANCE.

ARMOURED CRUISERS.

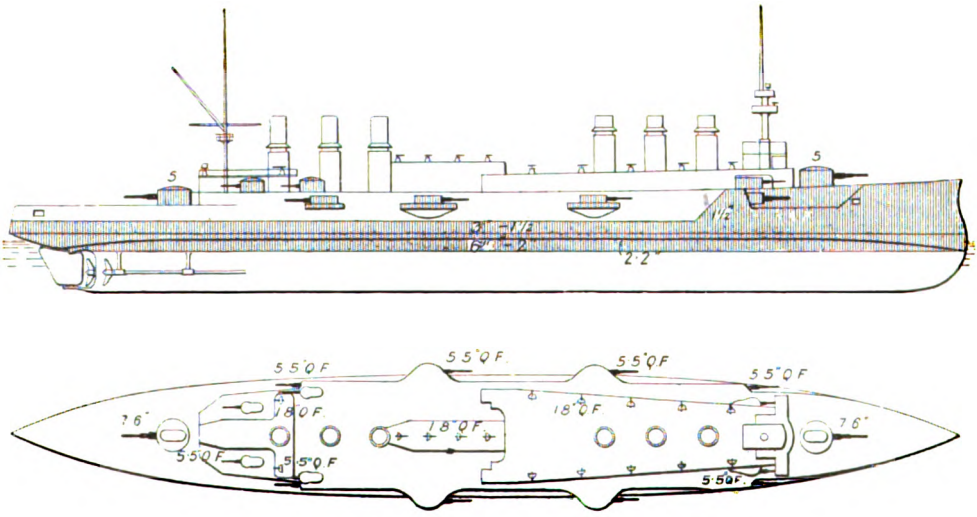
Dupetit-Thouars. **Gueydon.** **Montcalm.**



Length, 453 ft. ; 9367 tons ; Speed, 21–22·5 knots ; Completed, 1902–1905 ;
Armament, 2—7·6 in., 8—6·4 in., 4—4 in., 22 small.

See page 228.

Jeanne d'Arc.



Length, 477 ft. ; 11,092 tons ; Speed, 21·7 knots ; Completed, 1903 ;
Armament, 2—7·6 in., 14—5·5 in., 26 small.

See page 228.

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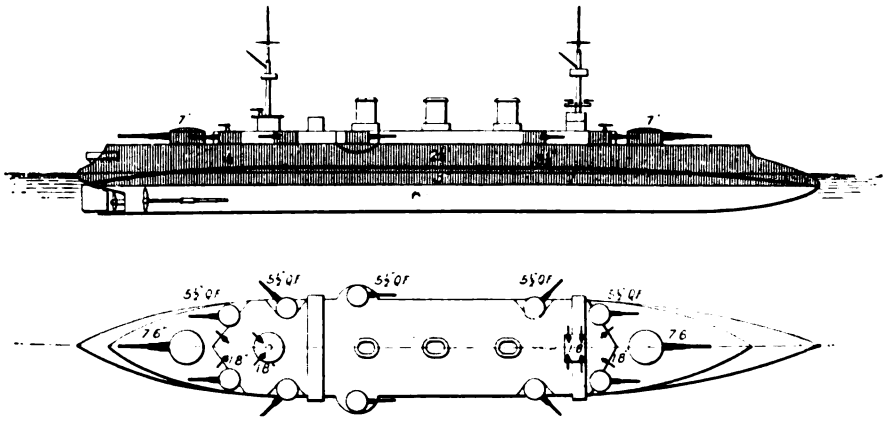
FRANCE.

ARMOURED CRUISER.

Pothuau.

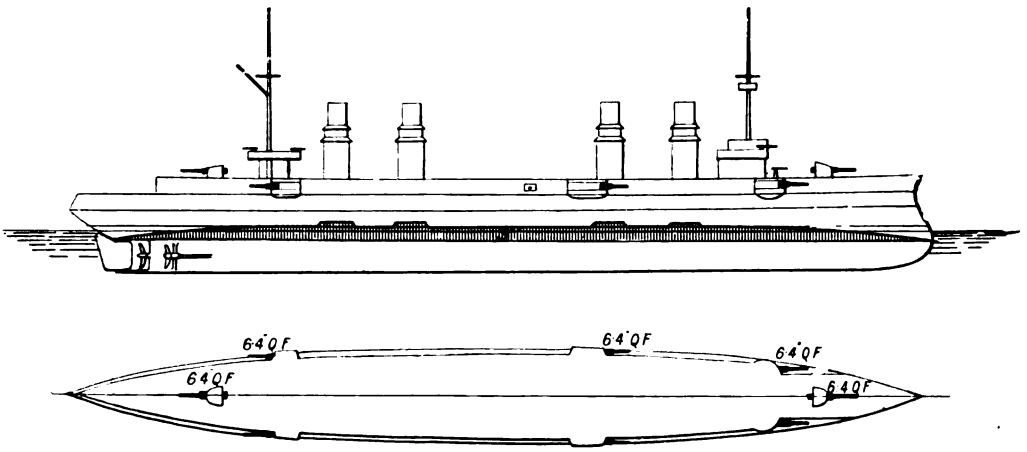


Length, 370 ft. ; 5374 tons ; Speed, 19·2 knots ; Completed, 1896 ;
Armament, 2–7·6 in., 10–5·5 in., 24 small.

See page 229.

CRUISER.

Jurien de la Gravière.



Length, 440 ft. ; 5595 tons ; Speed, 22·9 knots ; Completed, 1901 ;
Armament, 8–6·4 in., 12 small.

See page 232.

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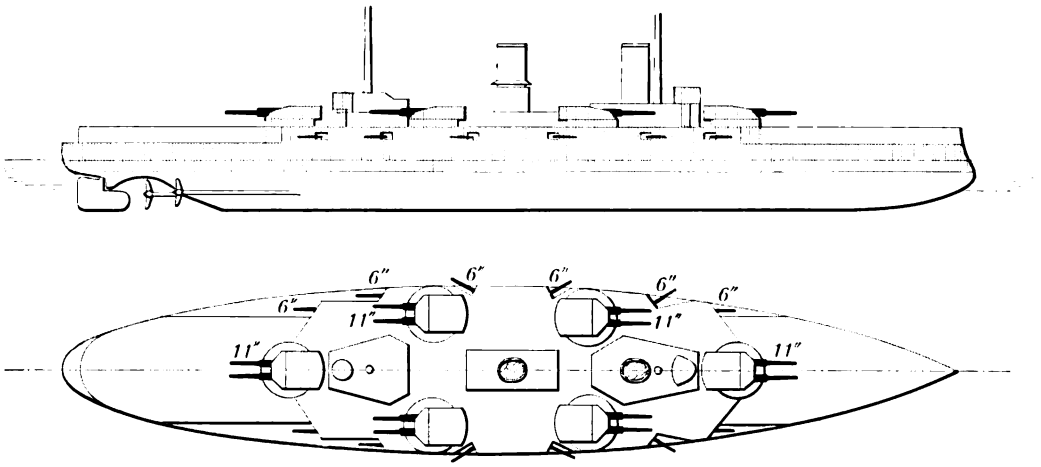
GERMANY.

BbattleshipS.

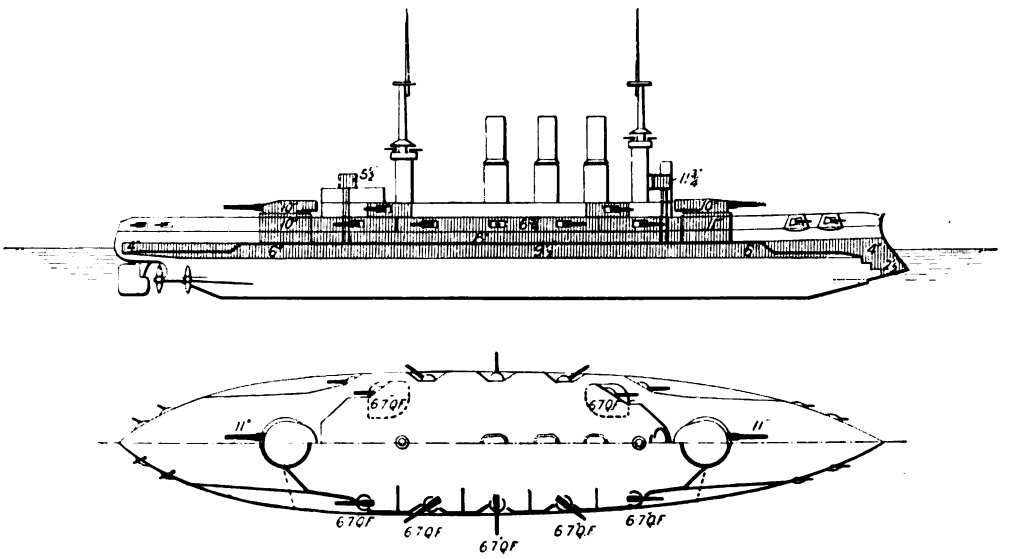
Nassau. **Posen.** **Rheinland.** **Westfalen.**



Length, 455 ft. ; 18,200 tons ; Speed, 20 knots ; Completed, 1909-1910 ;
Armament, 12—11 in., 12—6 in., 16—3·4 in.

See page 236.

Deutschland. **Hannover.** **Pommern.** **Schlesien.** **Schleswig Holstein.**



Length, 398 ft. ; 13,040 tons ; Speed, 18·5—19·2 knots ; Completed, 1906-1909 ;
Armament, 4—11 in., 14 - 6·7 in., 22—3·4 in., 8 small.

See page 235.

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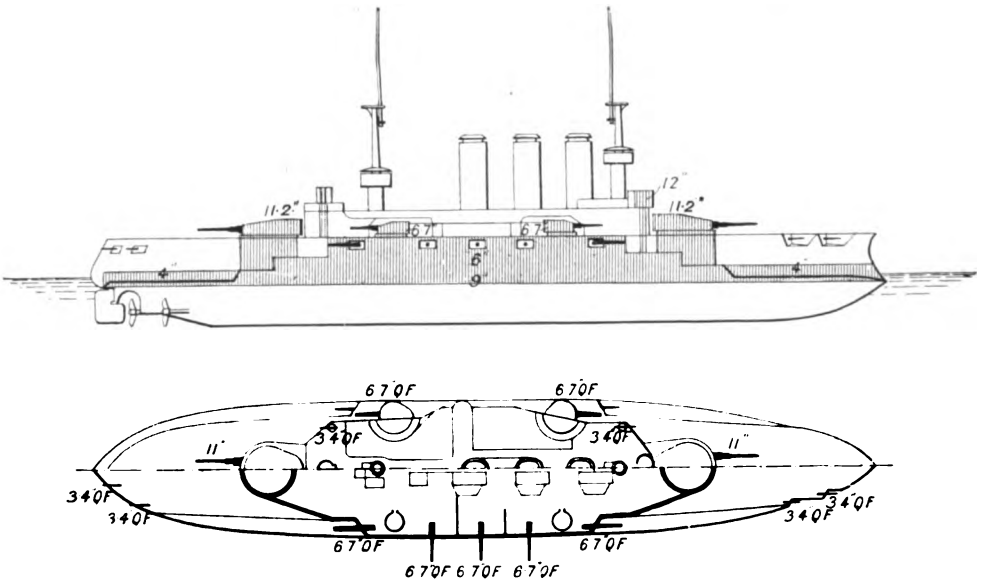
GERMANY.

BATTLESHIPS.

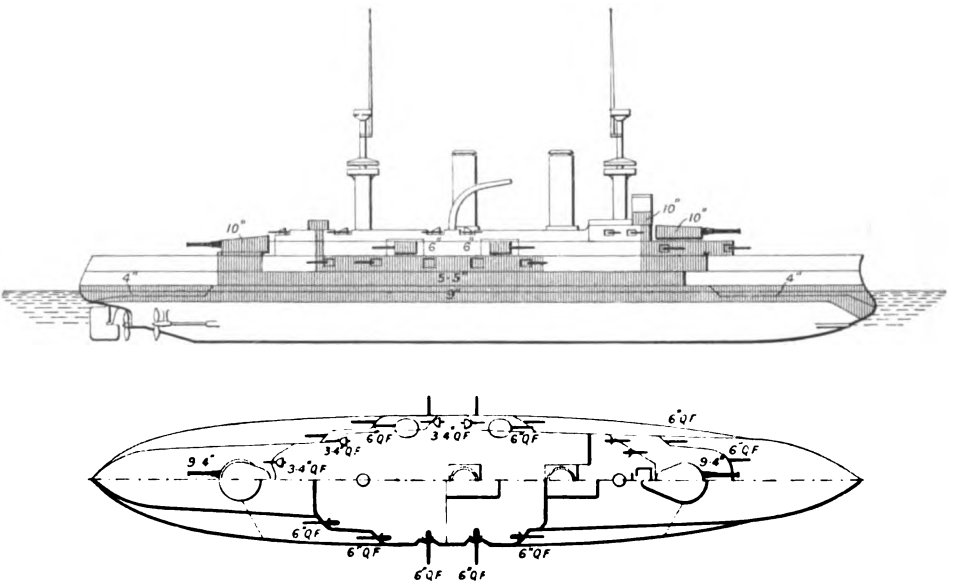
Braunschweig. **Elsass.** **Hessen.** **Lothringen.** **Preussen.**



Length, 398 ft.; 12,997 tons; Speed, 18–18·7 knots; Completed, 1904-1906; Armament, 4—11 in., 14—6·7 in., 12—3·4 in., 20 small.

See page 235.

Mecklenburg. **Schwaben.** **Wettin.** **Wittelsbach.** **Zähringen.**



Length, 394 ft.; 11,643 tons; Speed, 18–19 knots; Completed, 1902-1903; Armament, 4—9·4 in., 18—6 in., 12—3·4 in., 20 small.

See page 236

PLATE 30.

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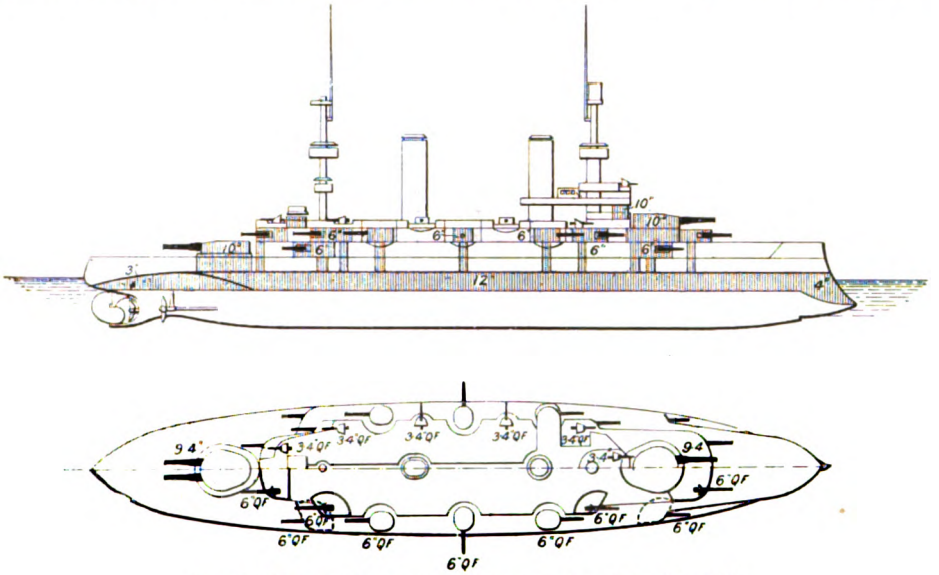
GERMANY.

BATTLESHIPS.

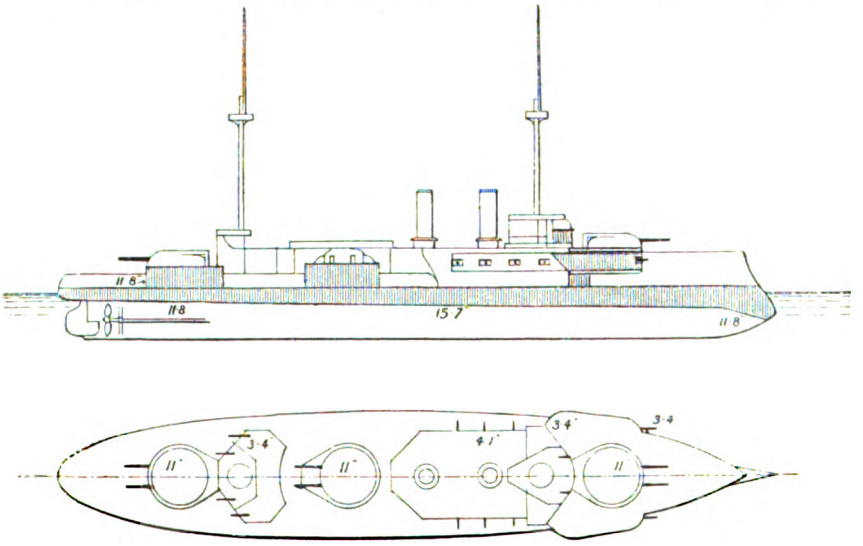
Kaiser Friedrich III. Kaiser Karl der Grosse. Kaiser Wilhelm II. Kaiser Wilhelm der Grosse.



Length, 377 ft. ; 10,974 tons ; Speed, 18 knots ; Completed, 1898-1901 ;
Armament, 4—9·4 in., 18—6 in., 12—3·4 in., 20 small.
NOTE.—Superstructure is being cut down.

See page 236.

Brandenburg. Kürfurst Friedrich Wilhelm. Weissenburg. Wörth.



Length, 354 ft. ; 9874 tons ; Speed, 16—17·2 knots ; Completed, 1893-1894 ;
Armament, 6—11 in., 8—4·1 in., 8—3·4 in., 22 small.

See page 235.

PLATE 31.
d

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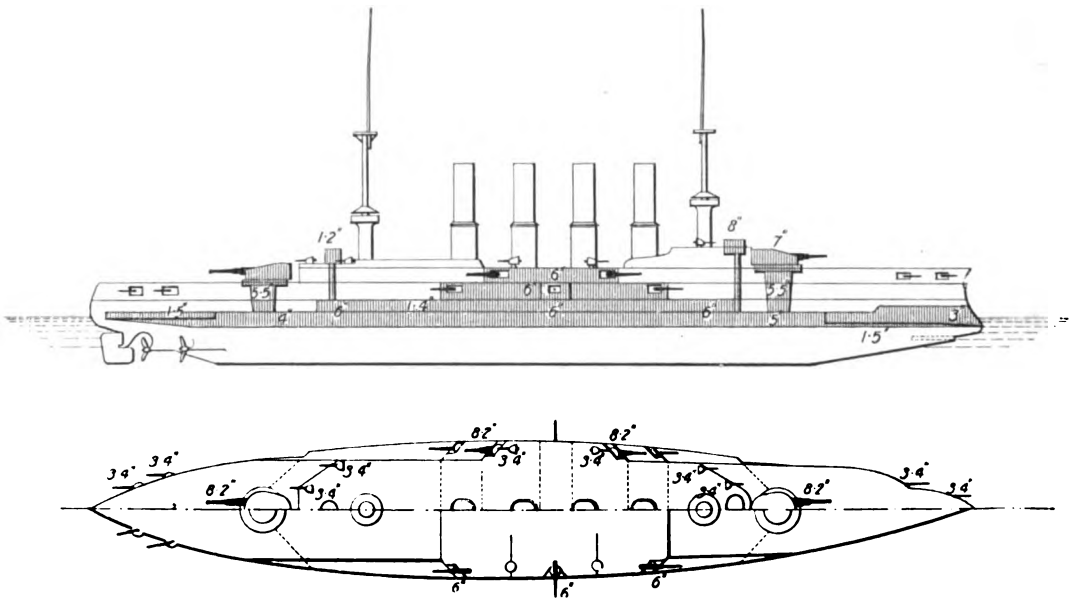
GERMANY.

ARMOURED CRUISERS.

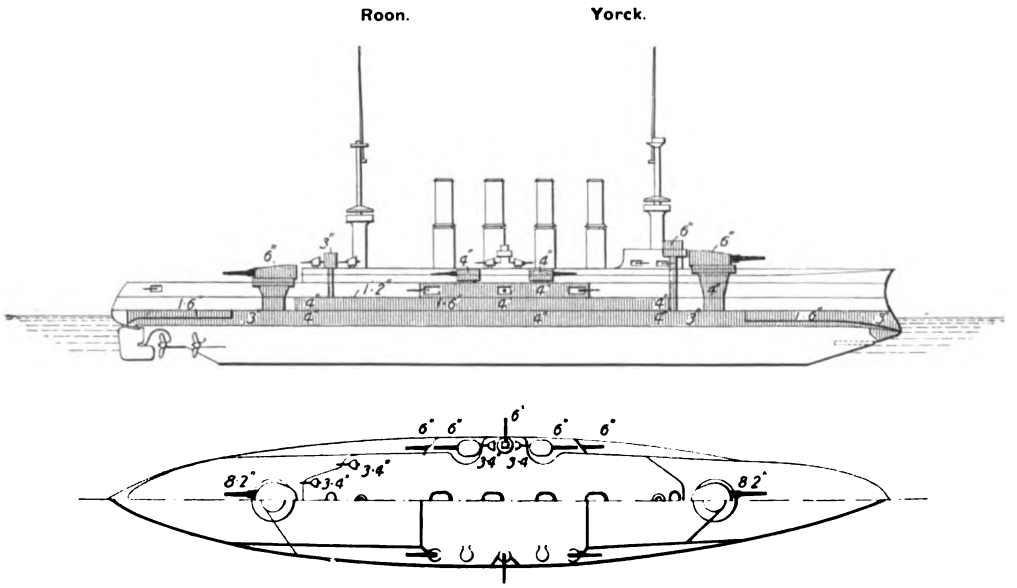
Gneisenau. **Scharnhorst.**



Length, 450 ft. ; 11,420 tons ; Speed, 22·5—23·8 knots ; Completed, 1908 ;
Armament, 8 - 8·2 in., 6—6 in., 20—3·4 in., 14 small.

See page 235.

Roon. **Yorck.**



Length, 403 ft. ; 9350 tons ; Speed, 21·1 knots ; Completed, 1905 ;
Armament, 4—8·2 in., 10 - 6 in., 16—3·4 in., 14 small.

See page 237.

PLATE 32.

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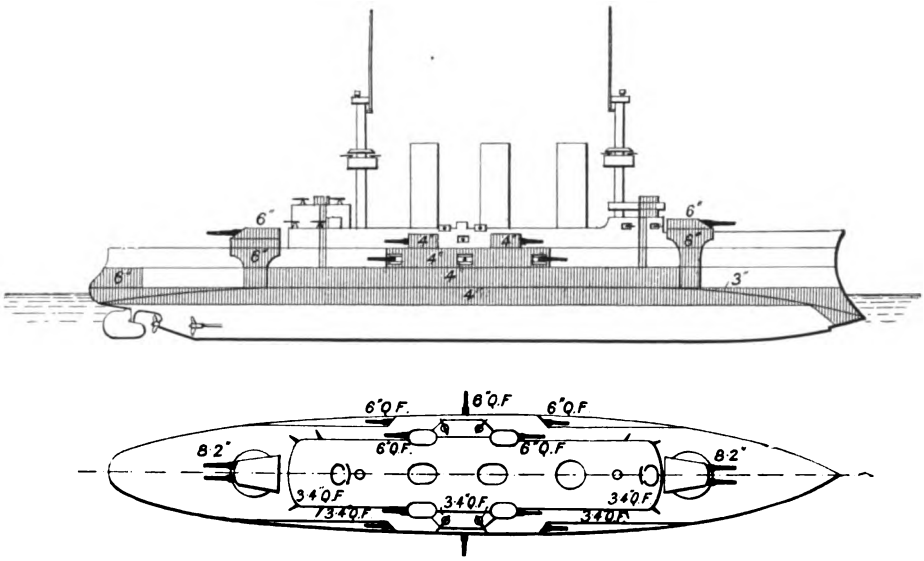
GERMANY.

ARMOURED CRUISERS.

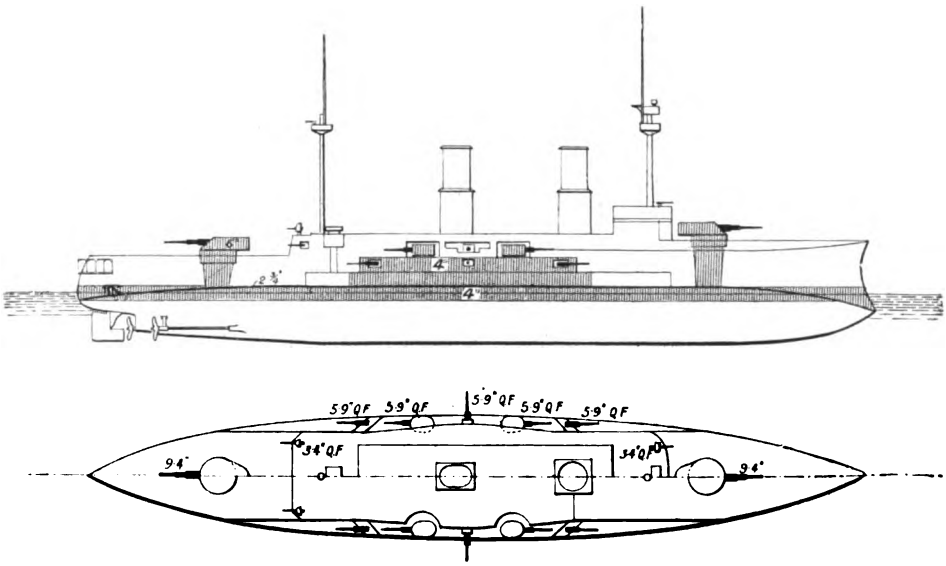
Prinz Adalbert. **Friedrich Karl.**



Length, 393 ft. ; 8858 tons ; Speed, 20·3—20·5 knots ; Completed, 1903–1904 ;
Armament, 4—8·2 in., 10—6 in., 12—3·4 in., 18 small.

See page 237.

Prinz Heinrich.



Length, 396 ft. ; 8759 tons ; Speed, 20 knots ; Completed, 1902 ;
Armament, 2—9·4 in., 10—5·9 in., 10—3·4 in., 14 small.

See page 237.

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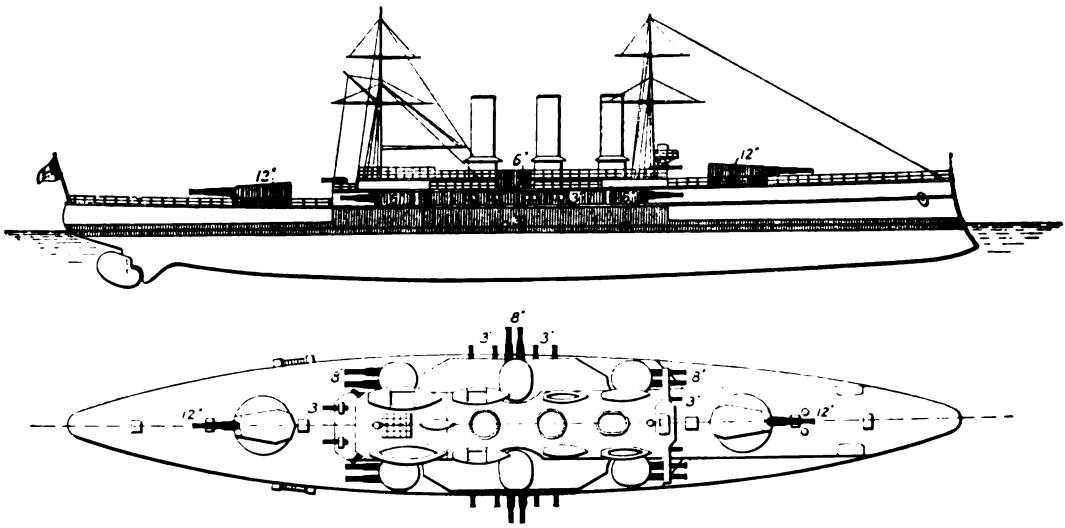
ITALY.

BATTLESHIPS.

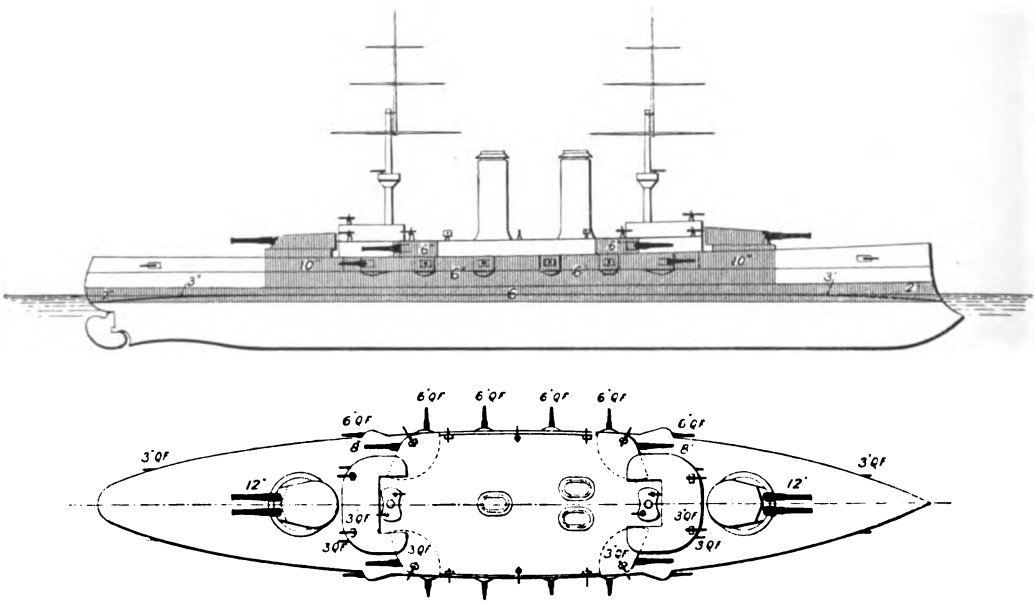
Napoli. **Regina Elena.** **Roma.** **Vittorio Emanuele.**



Length, 435 ft. ; 12,425 tons ; Speed, 22 knots ; Completed, 1907—1909 ;
Armament, 2—12 in., 12—8 in., 12—3 in., 12 small.

See page 243.

Benedetto Brin. **Regina Margherita.**



Length, 426 ft. ; 13,214 tons ; Speed, 19·5–20·2 knots ; Completed, 1904 ;
Armament, 4—12 in., 4—8 in., 12—6 in., 16—3 in., 12 small.

See page 243.

PLATE 34.

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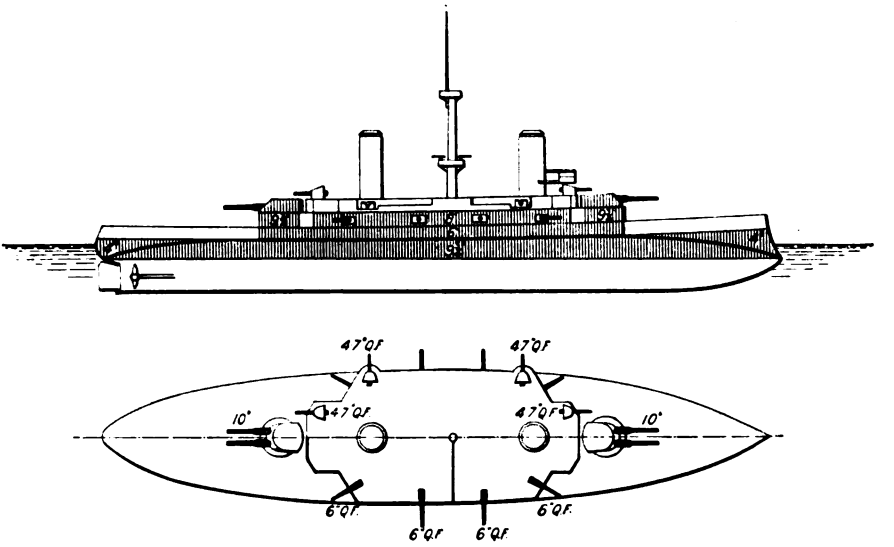
ITALY.

BATTLESHIPS.

Ammiraglio di St. Bon. **Emanuele Filiberto.**

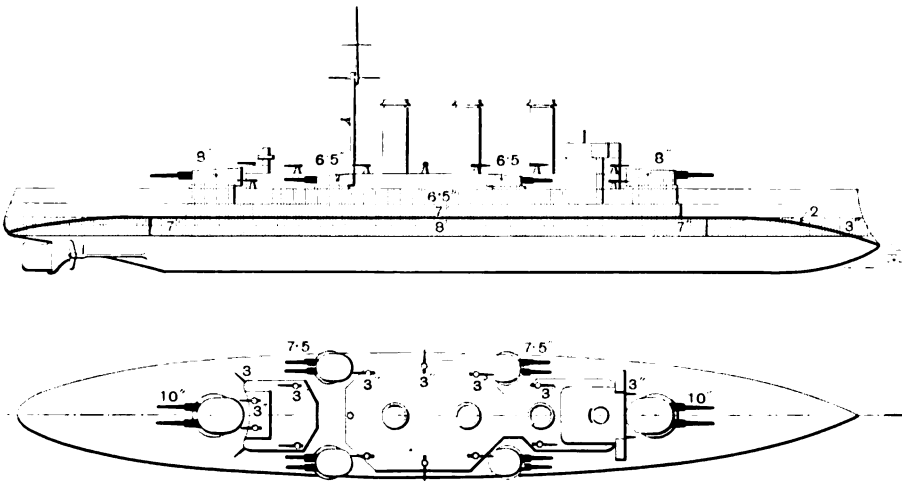


Length, 344 ft. ; 9645 tons ; Speed, 18·3 knots ; Completed, 1901-1902 ;
Armament, 4—10 in., 8—6 in., 8—4·7 in., 2—2·9 in., 22 small.

See page 243.

ARMOURED CRUISERS.

Amalfi. **Pisa.**



Length, 430 ft. ; 9,832 tons ; Speed, 23 knots ; Completed, 1909.
Armament, 4—10 in., 8—7·5 in., 16—3 in., 2 small.

See page 243.

PLATE 35.

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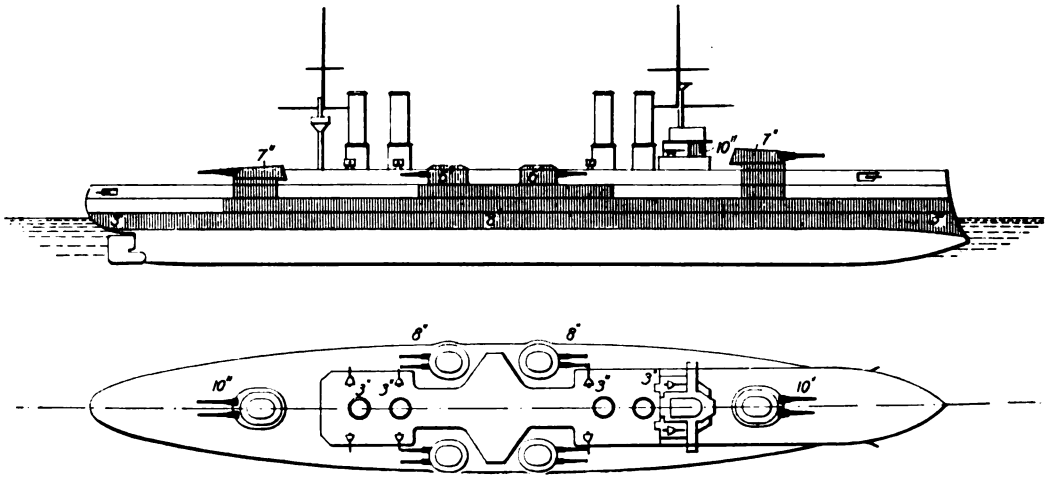
ITALY.

ARMOURED CRUISERS.

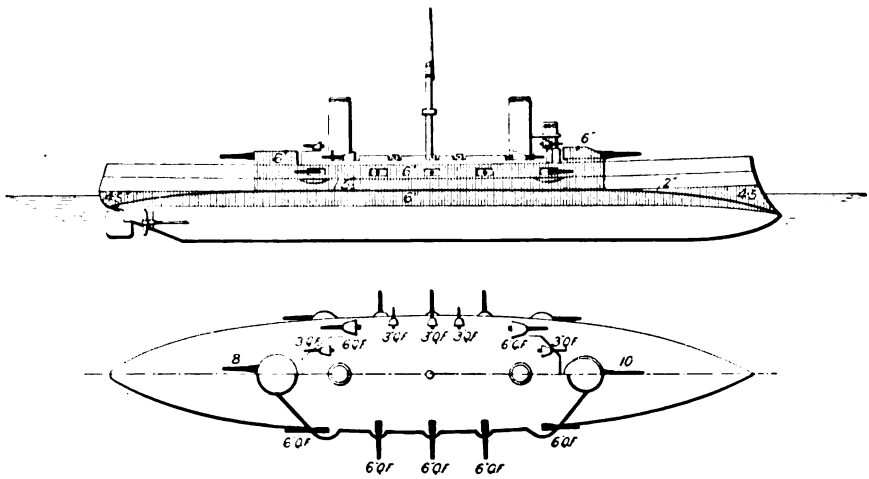
S. Giorgio. **S. Marco.**



Length, 430 ft. ; 9832 tons ; Speed, 22·5-23 knots ; Building ;
Armament, 4—10 in., 8—8 in., 16—3 in., 8 small.

See page **244.**

Francesco Ferruccio. **Giuseppe Garibaldi.** **Varese.**



Length, 344 ft. ; 7294 tons ; Speed, 20 knots ; Completed, 1900–1904 ;
Armament, 1–10 in., 2–8 in., 14—6 in., 10—3 in., 8 small.

See page **243.**

PLATE 36.

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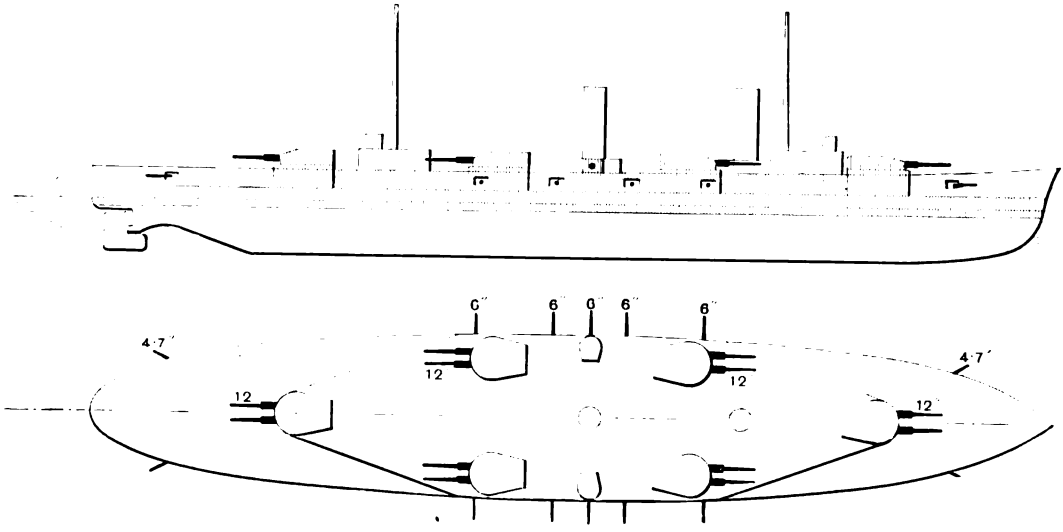
JAPAN.

BATTLESHIPS.

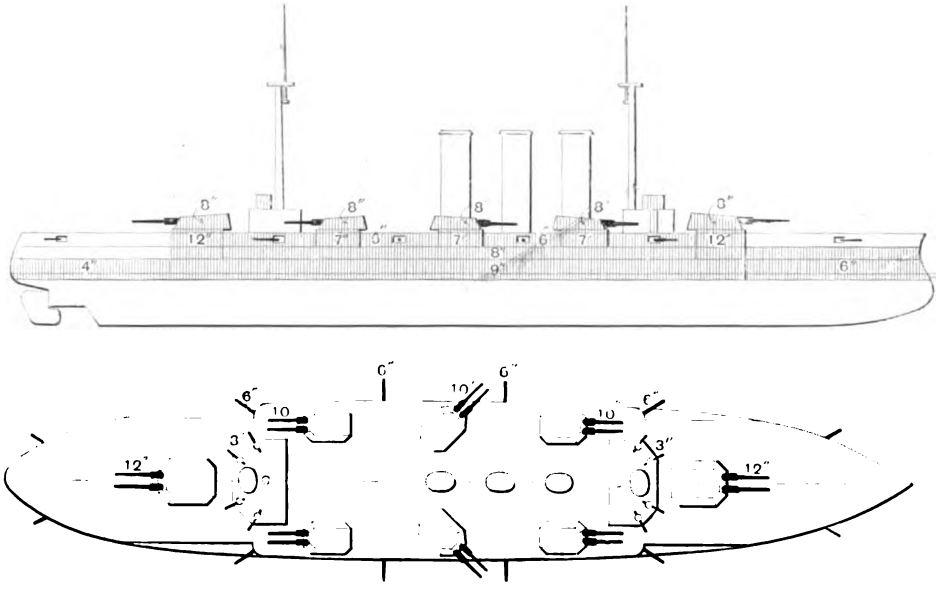
Kawachi. **Settsu.**



Length, 480 ft. ; 20,800 tons ; Speed, 20·5 knots ; Building ;
Armament, 12—12 in. ; 10—6 in. ; 12—4·7 in.

See page 248.

Aki.



Length, 482 ft. ; 19,800 tons ; Speed, 20·5 knots ; Building ;
Armament, 4—12 in., 12—10 in., 8—6 in., 8—12 pr., 4 small.

See page 247.

PLATE 37.

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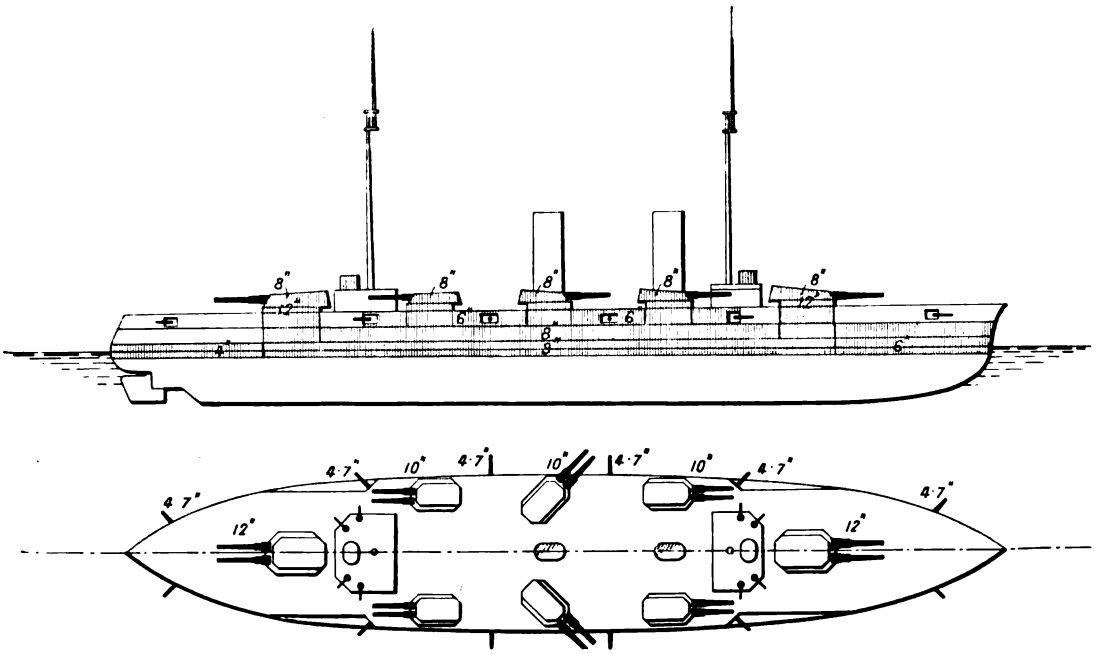
JAPAN.

BATTLESHIPS.

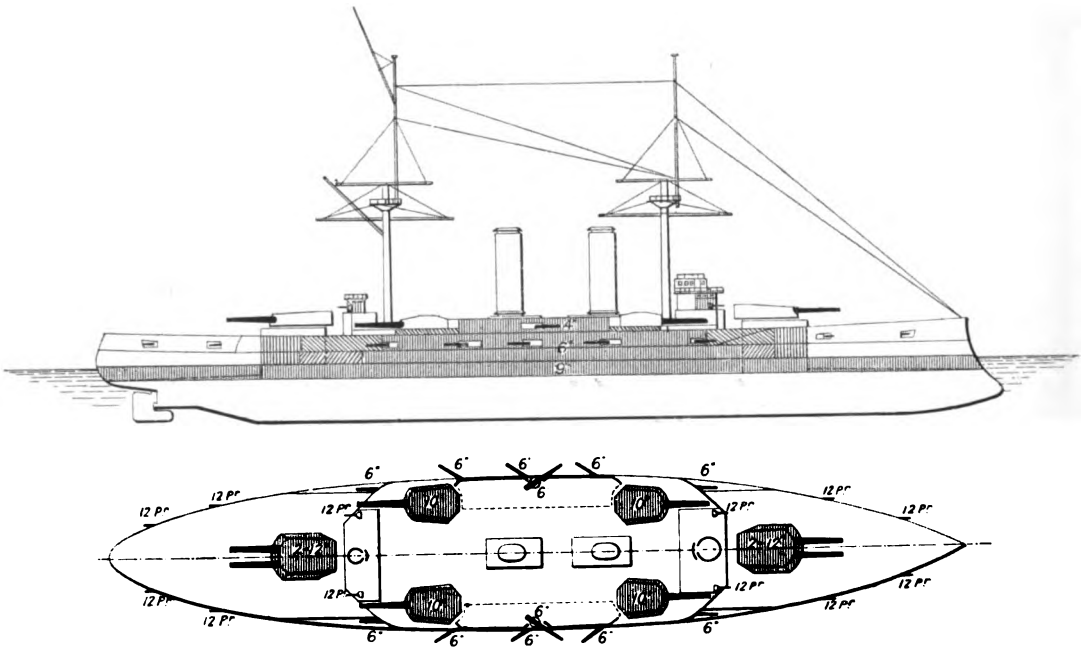
Satsuma.



Length, 482 ft. ; 19,350 tons ; Speed, 20·5 knots ; Completed, 1909;
Armament, 4—12 in., 12—10 in., 12—4·7 in., 4—12 pr., 4 small.

See page 248.

Kashima. **Katori.**



Length, 420–425 ft. ; 15,950–16,400 tons ; Speed, 19·5 knots ; Completed, 1906 ;
Armament, 4—12 in , 4—10 in., 12—6 in., 12—12 pr., 11 small.

See page 247.

PLATE 38.

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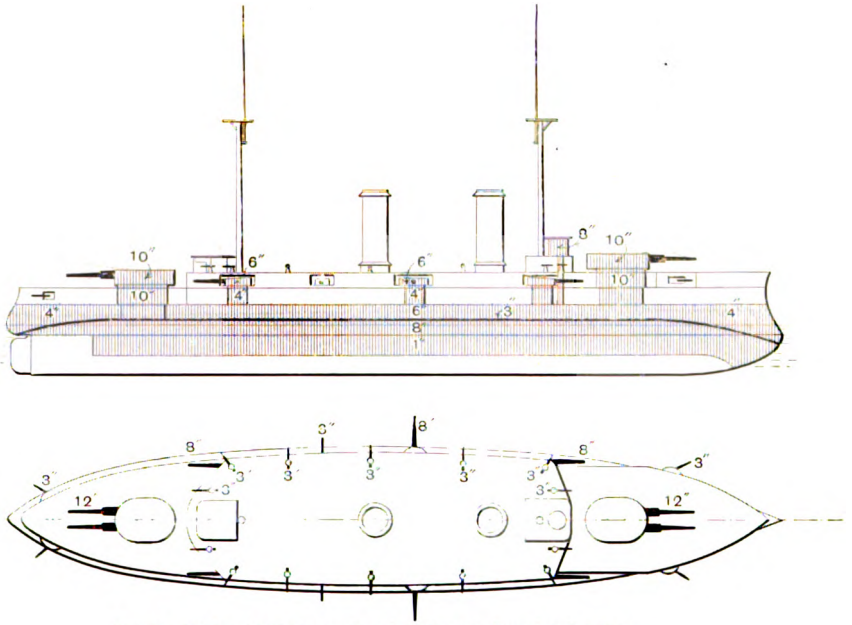
JAPAN.

BATTLESHIPS.

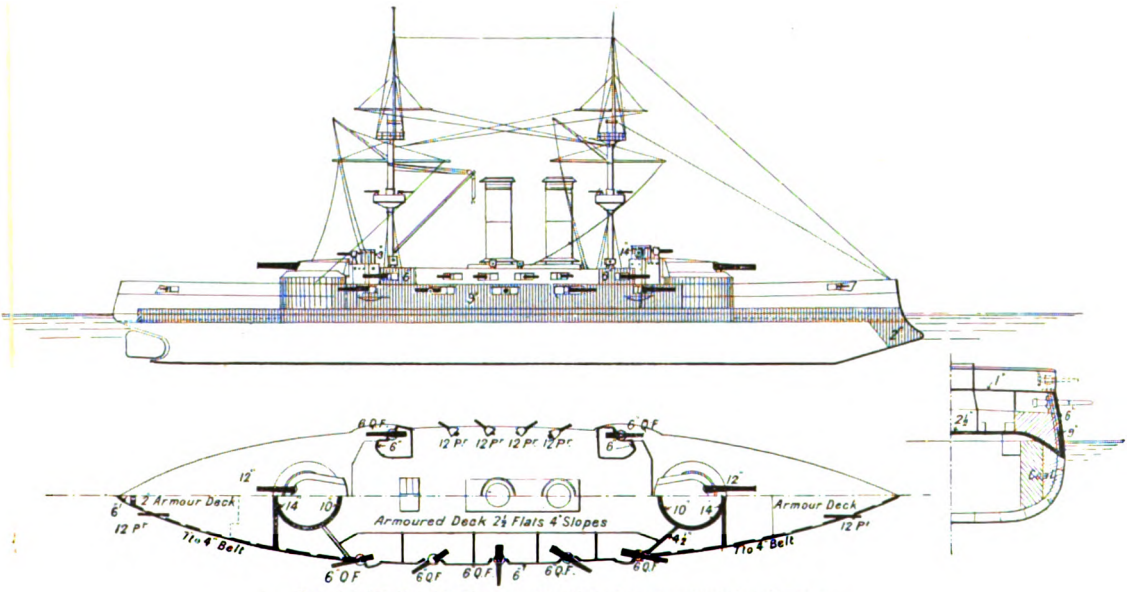
Iwami (*ex* Orel).



Length, 368 ft. ; 13,516 tons ; Speed, 18 knots ; Completed, 1904 ;
Armament, 4—12 in., 6—8 in., 20—3 in., 26 small.

See page **247.**

Mikasa.



Length, 400 ft. ; 15,200 tons ; Speed, 18·5 knots ; Completed, 1902 ;
Armament, 4—12 in., 4—10 in., 10—6 in., 20—12 pr., 20 small.

See page 248.

NOTE.—4—10 in. guns have been substituted for 4—6 in. on upper deck.

PLATE 39.

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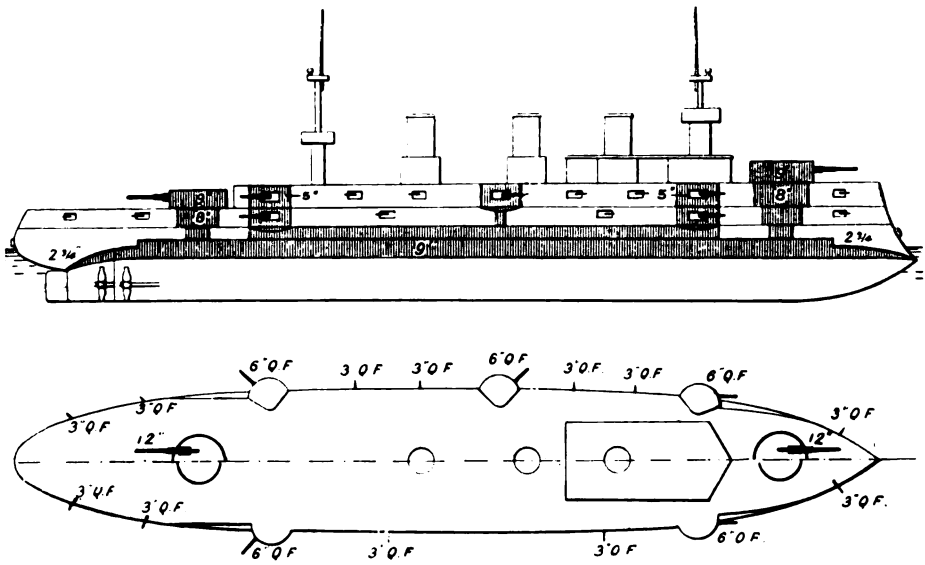
JAPAN.

Bbattleships.

Sagami *late* **Peresviet.** **Suo** *late* **Pobieda.**

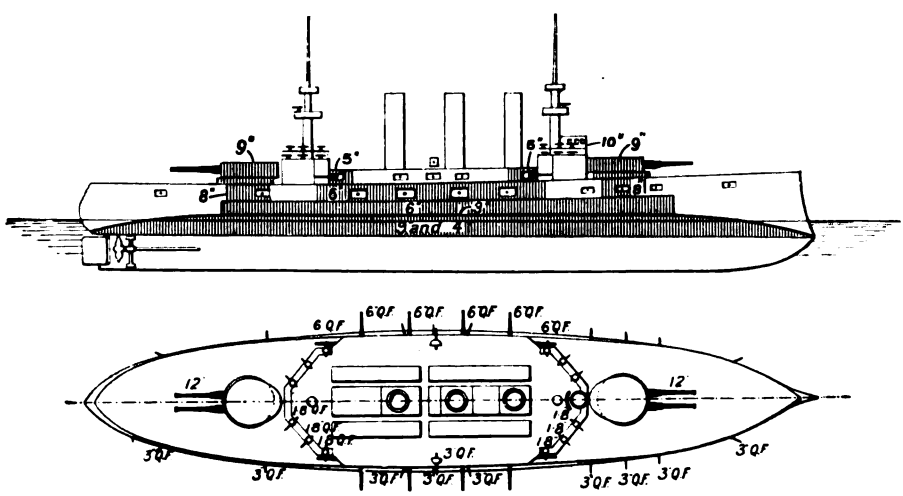


Note: In the "Pobieda" the Belt Extends the Full Length of the Ship.

Length, 401 ft. ; 12,674 tons ; Speed, 18 knots ; Completed, 1901 ;
Armament, 4—12 in., 10—6 in., 16—12 pr., 27 small.

See page 248.

Hizen *late* **Retvizan.**



Length, 374 ft. ; 12,700 tons ; Speed, 18 knots ; Completed, 1902 ;
Armament, 4—12 in., 12—6 in., 20—12 pr., 6 small.

See page 247.

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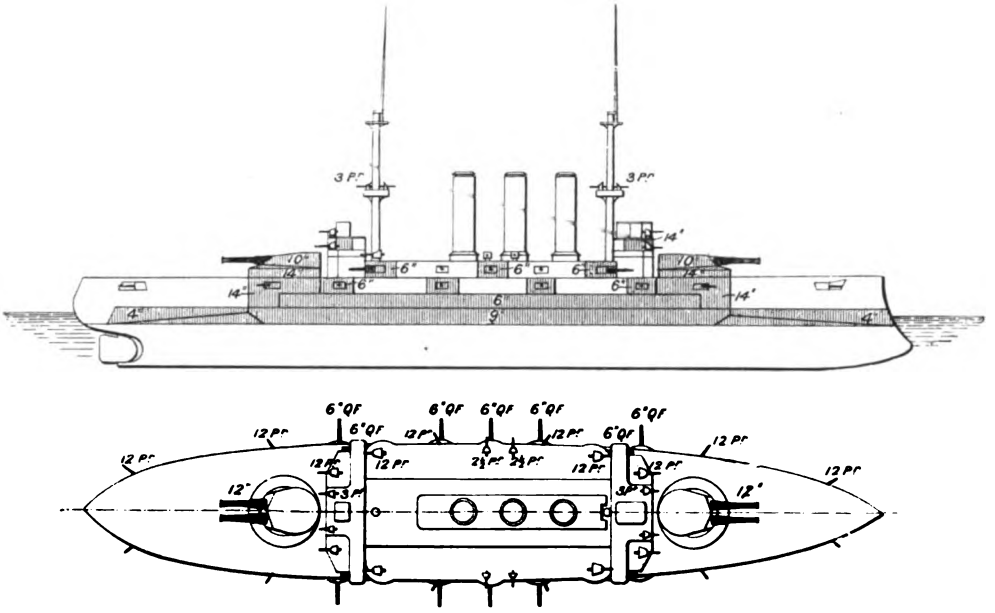
JAPAN.

BATTLESHIPS.

Asahi. **Shikishima.**

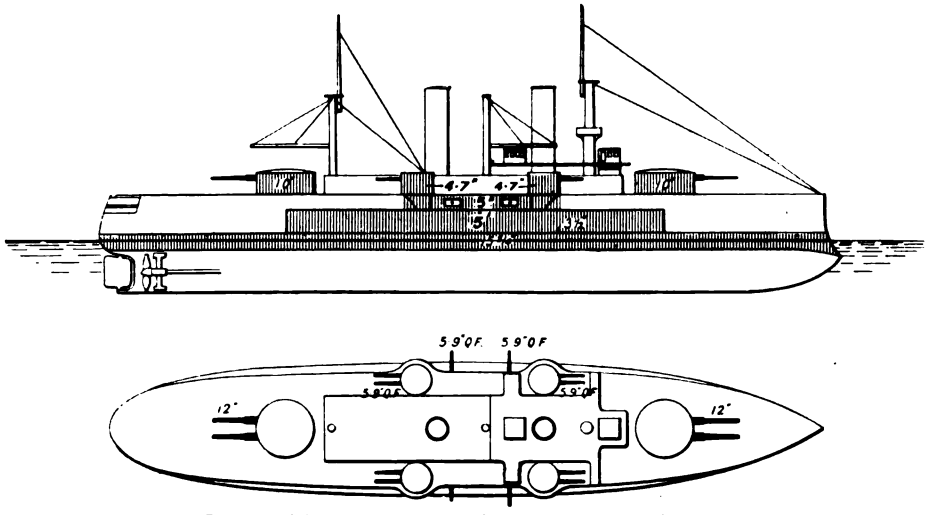


The "Asahi" has but two funnels.

Length, 400 ft. ; 14,850 - 15,800 tons; Speed, 18—18·3 knots ; Completed, 1899–1900 ;
Armament, 4—12 in., 14—6 in., 20—12 pr., 12 small.

See page 247.

Tango *late* **Poltava.**



Length, 367 ft. ; 10,960 tons ; Speed, 16 knots ; Completed, 1898 ;
Armament, 4- 12 in., 12–5·9 in., 14 small.

See page 248.

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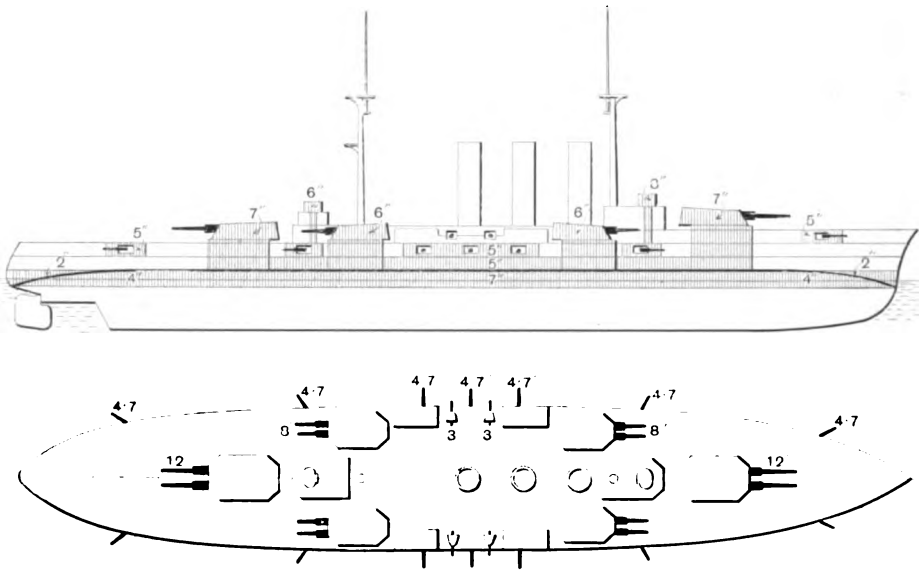
JAPAN.

ARMOURED CRUISERS.

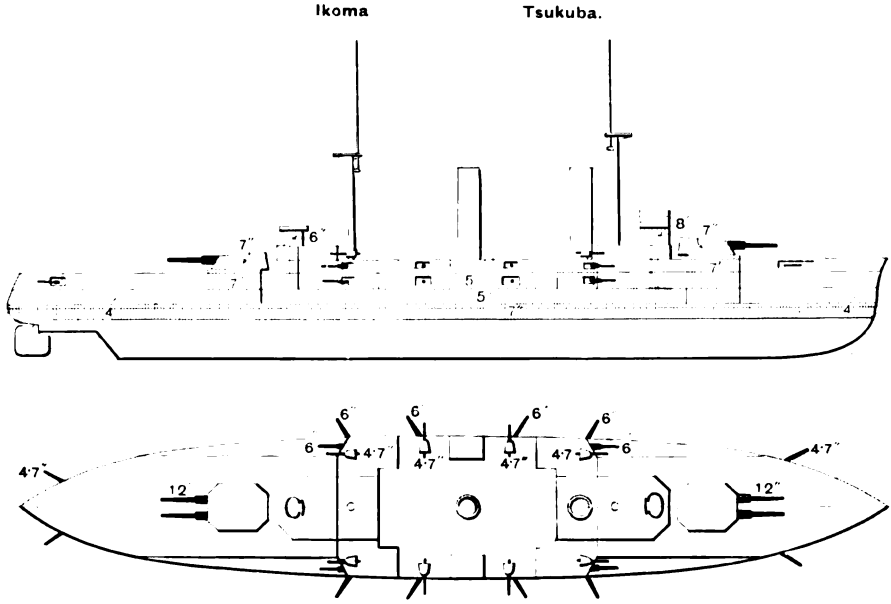
Ibuki. **Kurama.**



Length, 450 ft. ; 14,620 tons ; Speed, 22 knots ; Ibuki, Completed, 1909 ; Kurama, Building ; Armament, 4—12 in., 8—8 in., 14—4·7 in., 9 small.

See page 247.

Ikoma **Tsukuba.**



Length, 440 ft. ; 13,750 tons ; Speed, 21 knots ; Completed, 1907 ; Armament, 4—12 in., 12—6 in., 12—4·7 in., 8 small.

See page 247.

PLATE 42.

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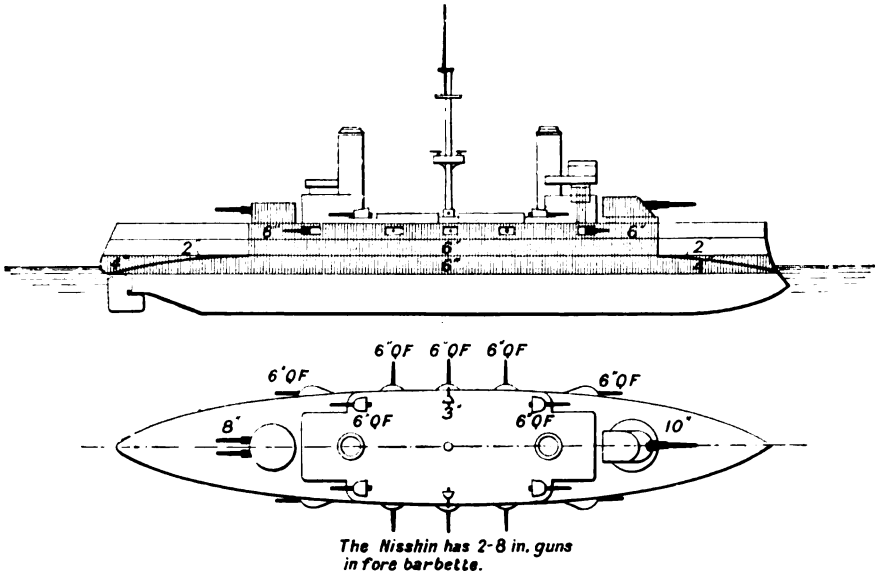
JAPAN.

ARMOURED CRUISERS.

Kasuga. **Nisshin.**

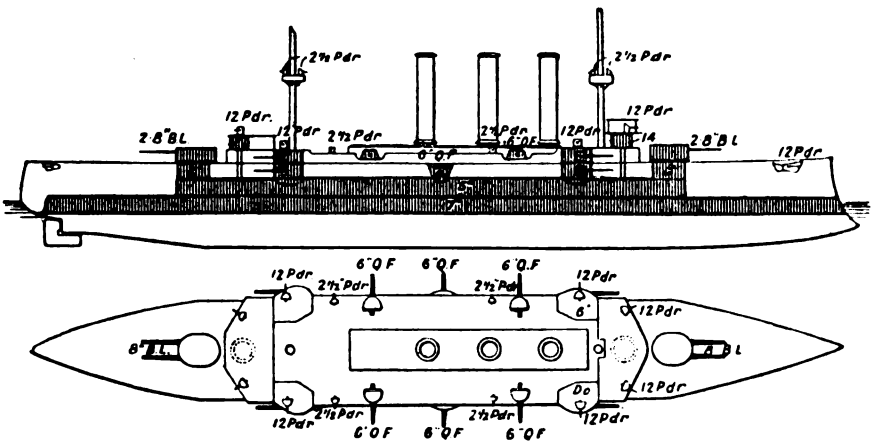


The Nisshin has 2-8 in. guns in fore barbette.

Length, 344 ft. ; 7250—7700 tons ; Speed, 20 knots ; Completed, 1904 ;
Armament, 1—10 in., 2—8 in., 14—6 in., 10—3 in., 8 small.

See page 248.

Idzumo. ***Adzuma.** **Iwati.** ***Yakumo.**



Length, 400—431 ft. ; 9436—9850 tons ; Speed, 20—22 knots ; Completed, 1901 ;
Armament, 4—8 in., 14—6 in., 12—12 pr., 8 small.

*12—6 in. guns.

See page 247.

PLATE 43.

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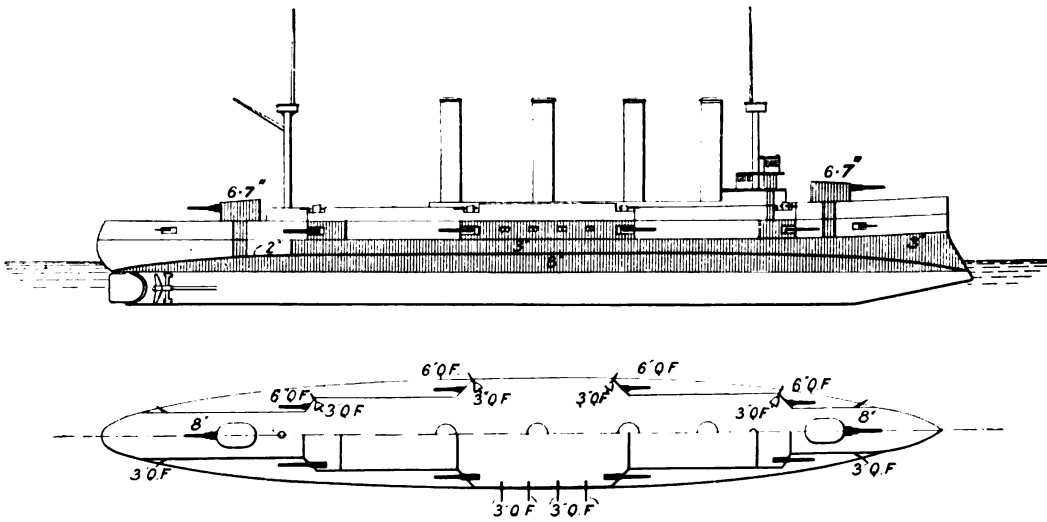
JAPAN.

ARMOURED CRUISERS.

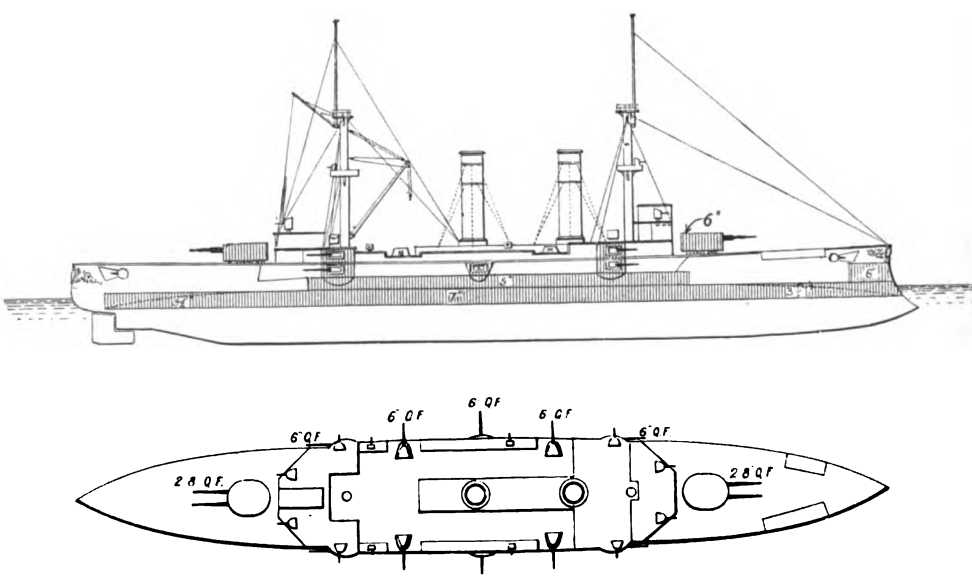
Aso *late* **Bayan.**



Length, 443 ft. ; 7726 tons ; Speed, 22 knots ; Completed, 1902 ;
Armament, 2—8 in., 8—6 in., 32—3 in., 29 small.

See page 247.

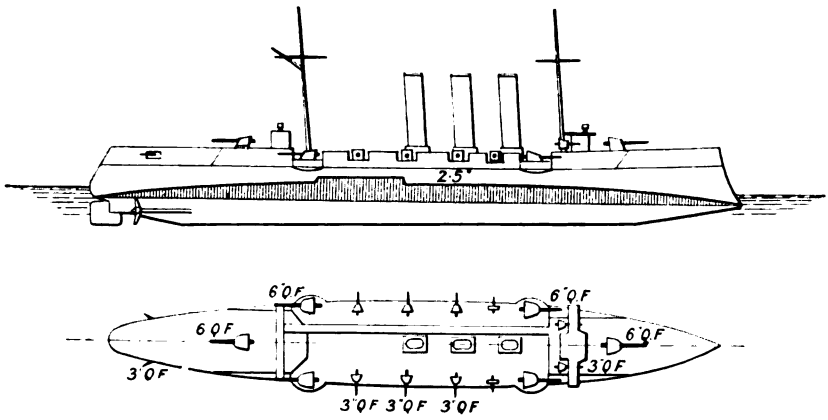
Asama. **Tokiwa.**


6"
6"Q.F.
6"Q.F.
6"Q.F.

JAPAN.

CRUISERS.

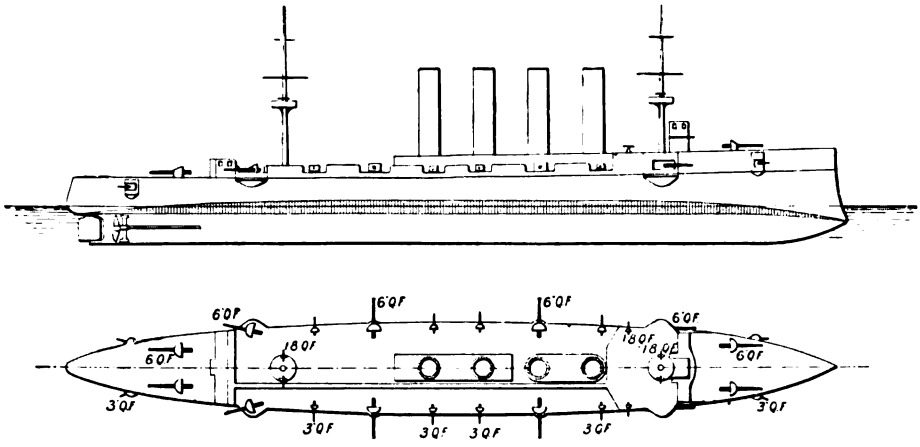
Niitaka. **Tsushima.**



Length, 235 ft. ; 3365 tons ; Speed, 20 knots ; Completed, 1904-5 ;
Armament, 6—6 in., 10—3 in., 4 small.

See page 250.

Sōya *late* **Waryag.**



Length, 420 ft. ; 6500 tons ; Speed, 23 knots ; Completed, 1900 ;
Armament, 12—6 in., 12—12 pr., 6 small.

See page 250.

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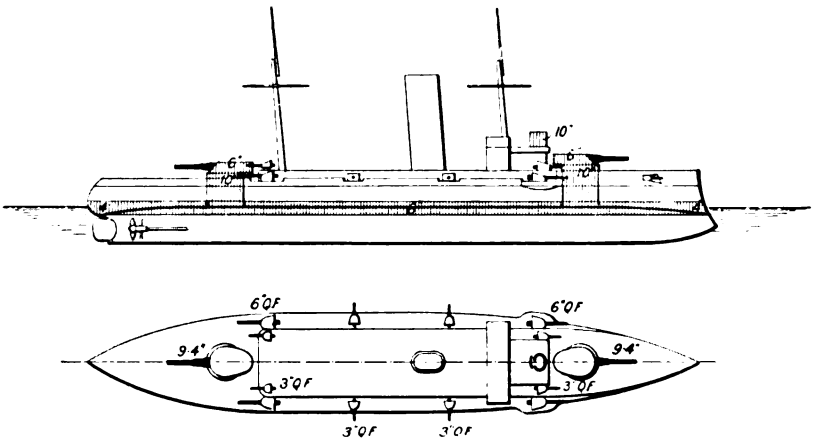
NETHERLANDS.

COAST DEFENCE SHIPS.

De Ruyter. **Hertog Hendrik.** **Koningin Regentes.** **Marten Tromp.**



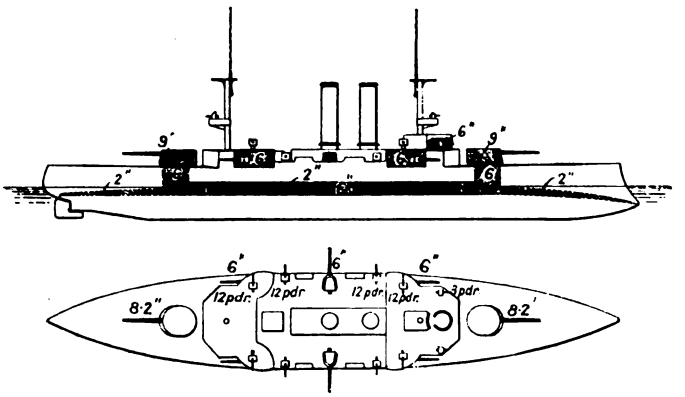
Length, 317 ft. ; 5014—5211 tons ; Speed, 16·5 knots ; Completed, 1902—1906 ; Armament, 2—9·4 in., 4—6 in., 10—3 in., 4 small.

See page 251.

NORWAY.

COAST DEFENCE SHIPS.

Norge. **Eidsvoid.**



Length, 200 ft. ; 3847 tons ; Speed, 16·5 knots : Completed, 1901 ; Armament, 2—8·2 in., 6—6 in., 8—12 pr., 6 small.

See page 253.

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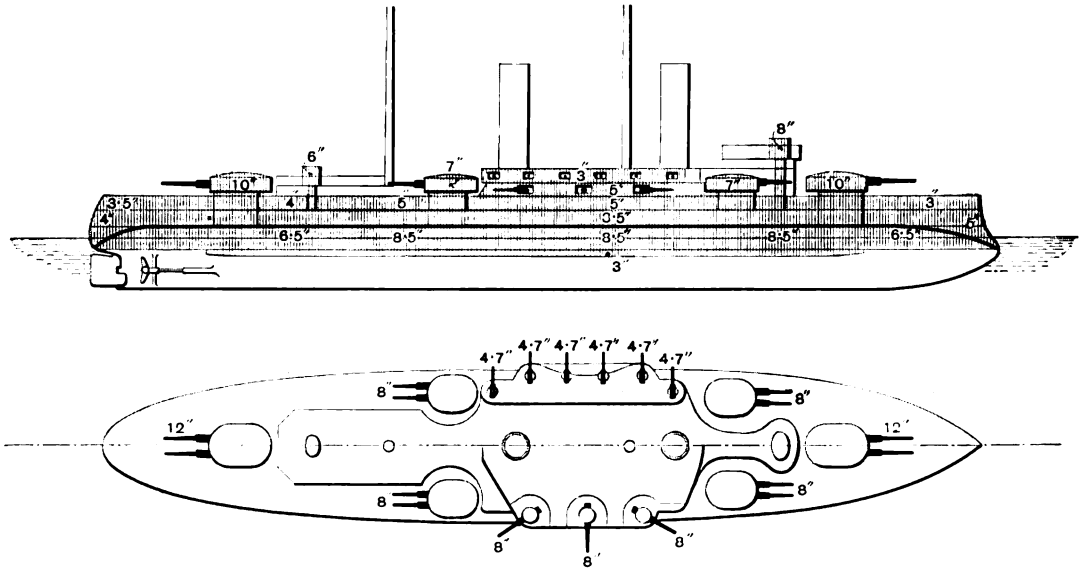
RUSSIA.

BATTLESHIPS.

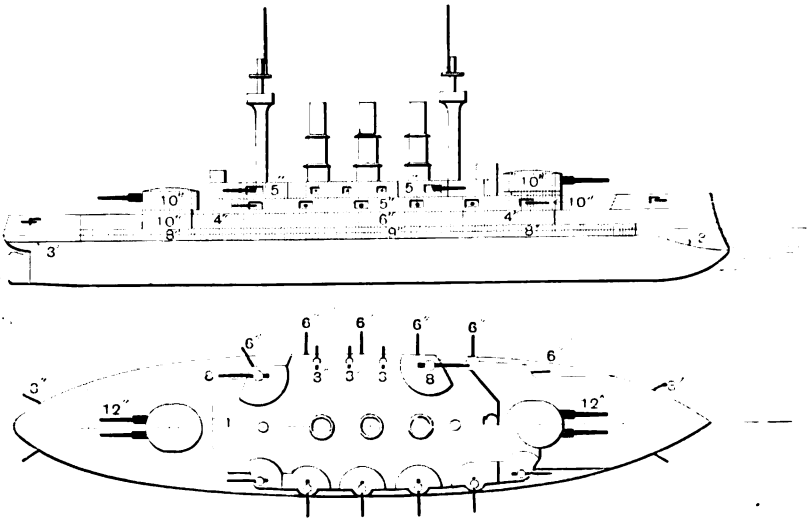
Andrei Pervozvannyi. **Imperator Pavel.**



Length, 430 ft. ; 17,200 tons ; Speed, 18 knots ; Building ;
Armament, 4—12 in., 14—8 in., 20—4·7 in., 14 small.

See page 255.

Evstafi. **Joann Zlatoust.**



Length, 372 ft. ; 12,733 tons ; Speed, 16 knots ; Building ;
Armament, 4—12 in., 4—8 in., 12—6 in., 14—3 in. 18 small.

See page 255.

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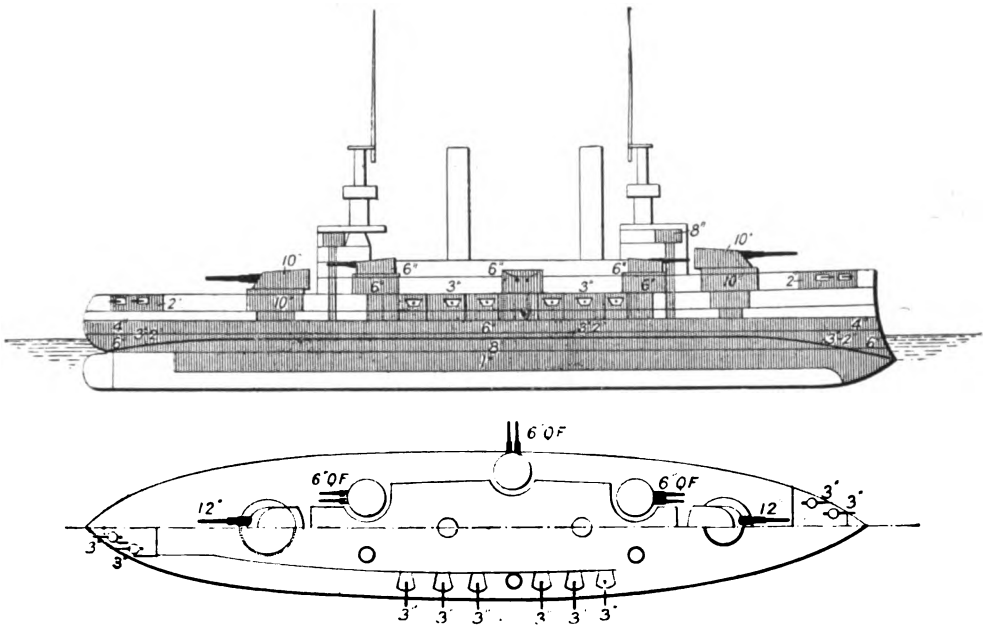
RUSSIA.

BATTLESHIPS

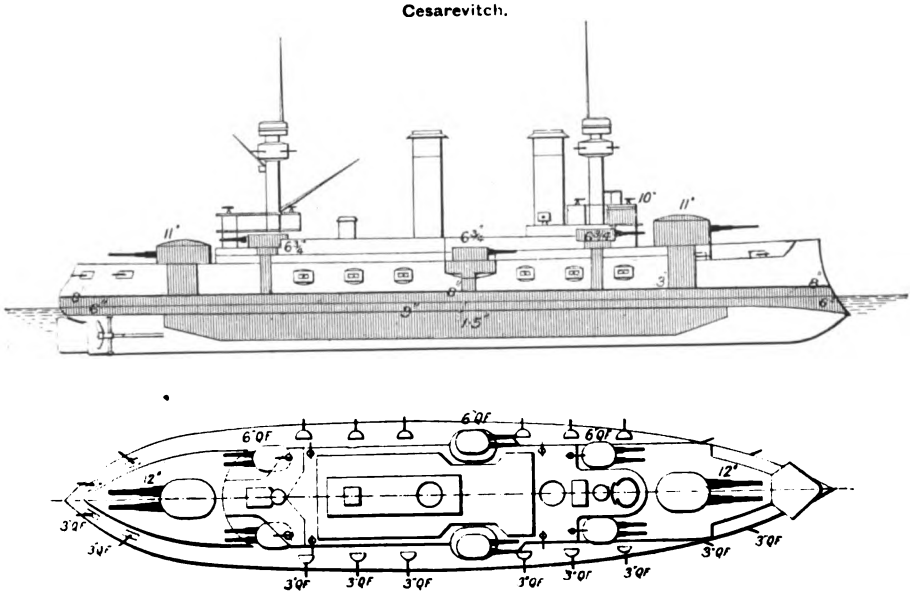
Slava.



Length, 367 ft. ; 13,516 tons ; Speed, 18 knots ; Completed, 1906 ;
Armament, 4—12 in., 12—6 in., 20—3 in., 26 small.

See page 256.

Cesarevitch.



Length, 389 ft. ; 12,912 tons ; Speed, 19·6 knots ; Completed, 1902 ;
Armament, 4—12 in., 12—6 in., 20—3 in., 32 small.

See page 255.

PLATE 48.

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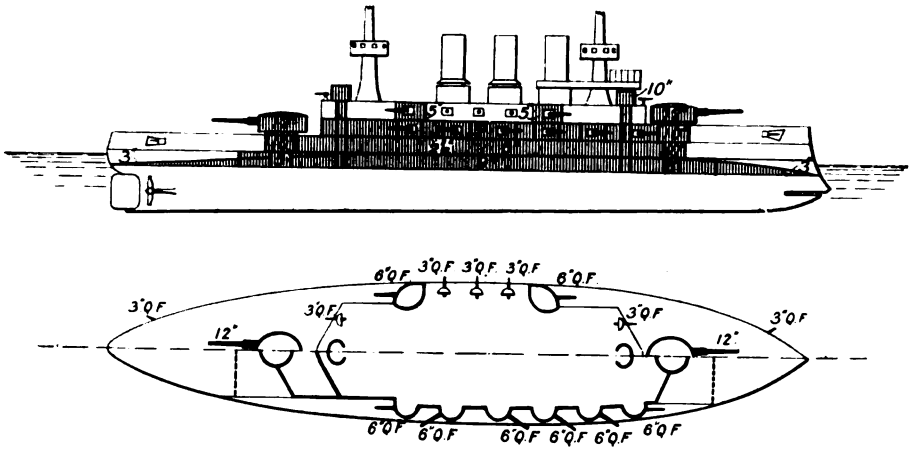
RUSSIA.

BATTLESHIPS.

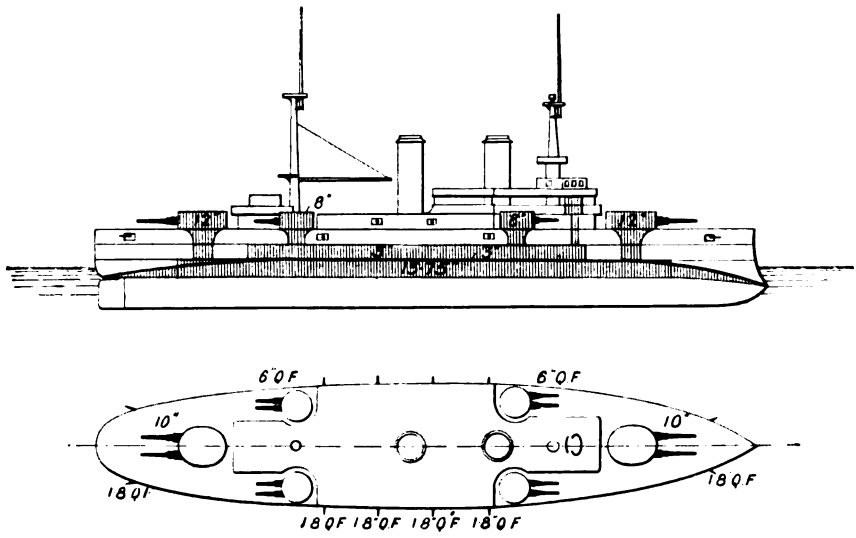
Panteleimon, *ex* Kniaz Potemkine Tavritchesky.



Length, 372 ft. ; 12,480 tons ; Speed, 17 knots ; Completed, 1902 ;
Armament, 4—12 in., 16—6 in., 14—3 in., 28 small.

See page 256.

Rostislav.



Length, 341 ft. ; 8380 tons ; Speed, 16 knots ; Completed, 1899 :
Armament, 4—10 in., 8—6 in., 18 small.

See page 256.

PLATE 49.

e 2

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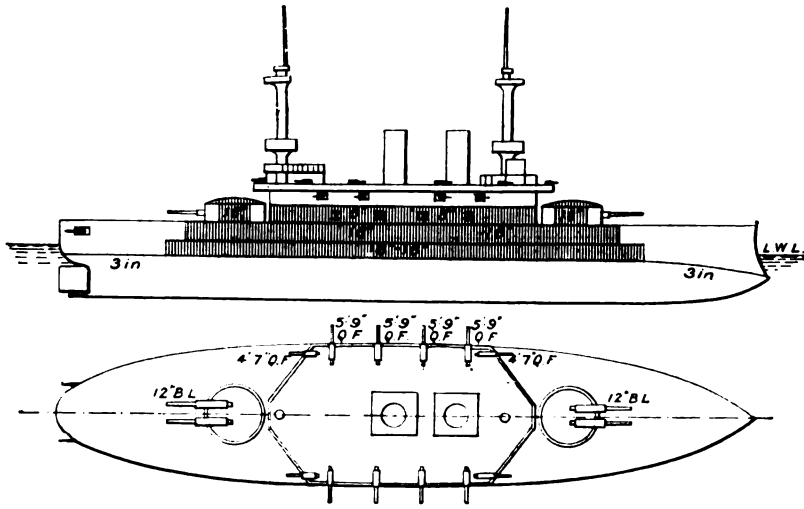
RUSSIA.

BATTLESHIPS.

Tria Sviatitelia.

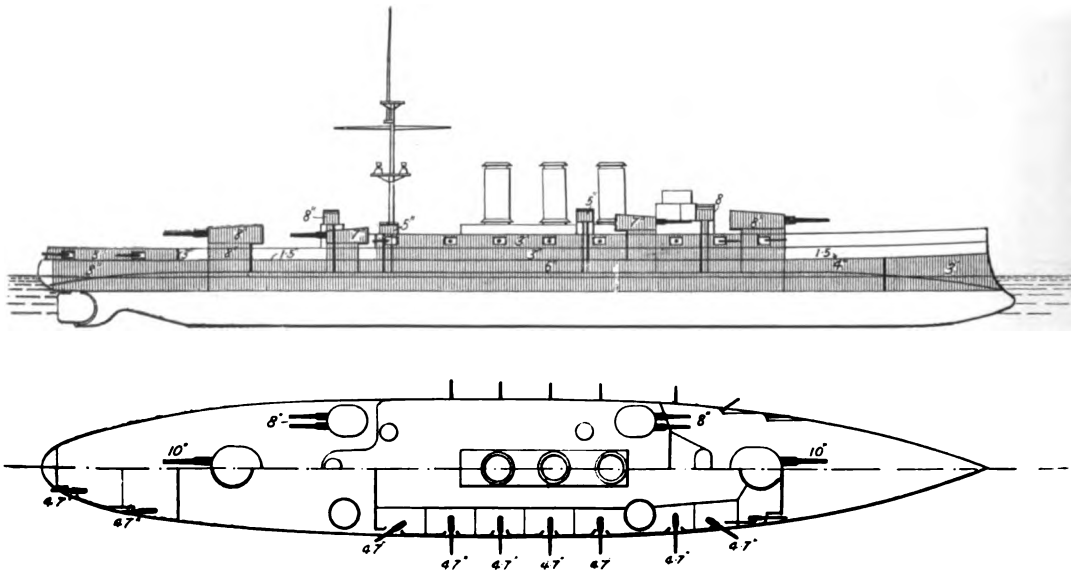


Length, 357 ft. ; 13,318 tons ; Speed, 18 knots ; Completed, 1896 ;
Armament, 4—12 in., 8—5·9 in., 4—4·7 in., 50 small.

See page 256.

ARMOURED CRUISERS.

Rurik.



Length, 490 ft. ; 15,170 tons ; Speed, 21 knots ; Completed, 1907 ;
Armament, 4—10 in., 8—8 in., 20—4·7 in., 12 small.

See page 256

PLATE 50.

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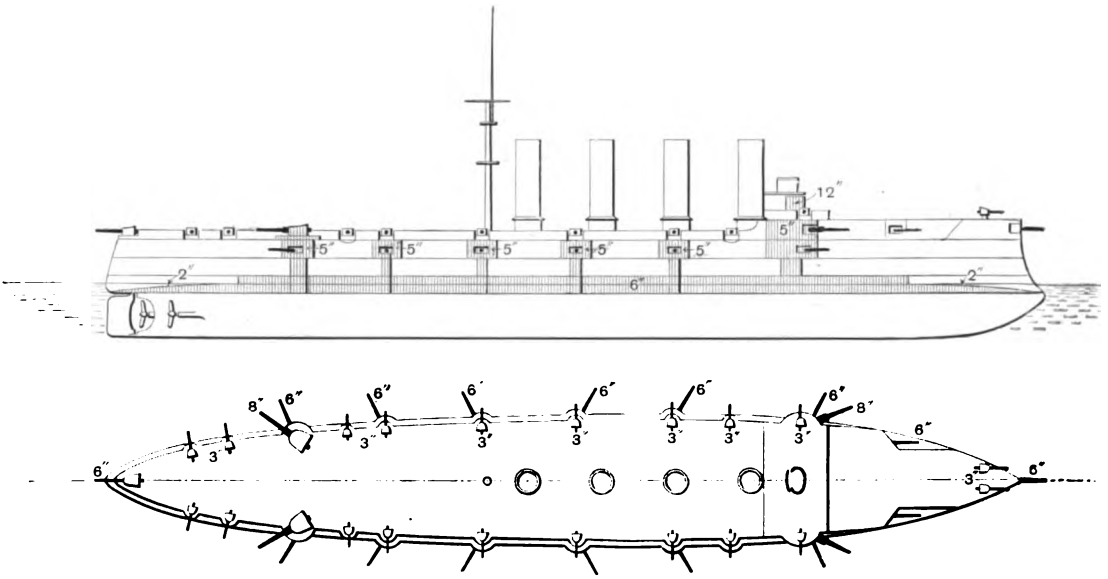
RUSSIA.

ARMOURED CRUISERS.

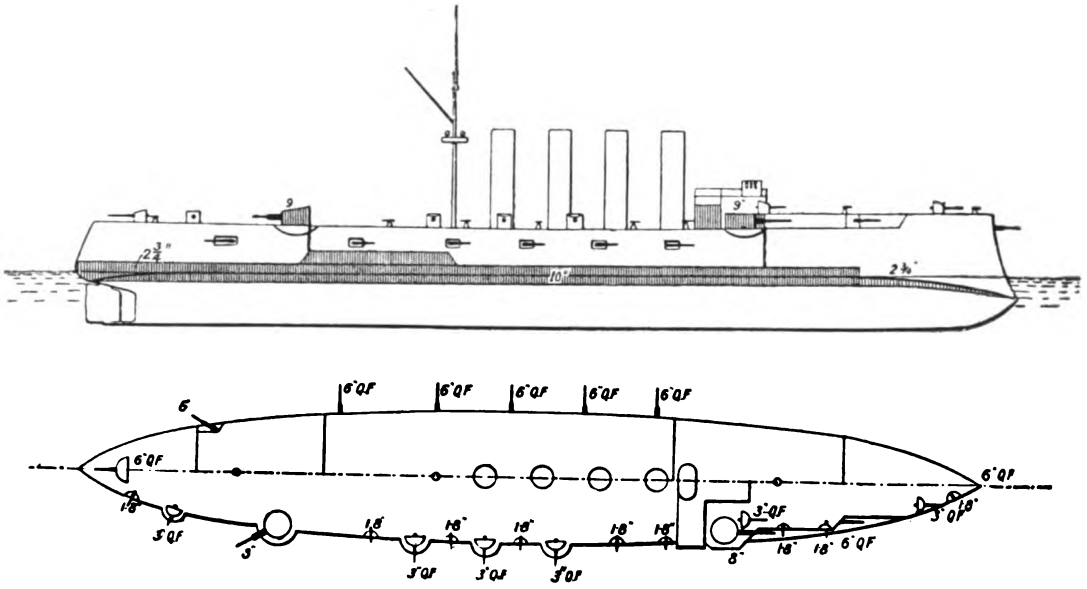
Gromoboi.



Length, 473 ft. : 12,336 tons ; Speed, 20 knots ; Completed, 1900 ;
Armament, 4—8 in., 16—6 in., 20—3 in., 20 small.

See page 255.

Rossia.



Length, 480 ft. ; 12,130 tons ; Speed, 20 knots ; Completed, 1898 ;
Armament, 4—8 in., 16—6 in., 12—3 in., 20 small.

See page 256.

PLATE 51.

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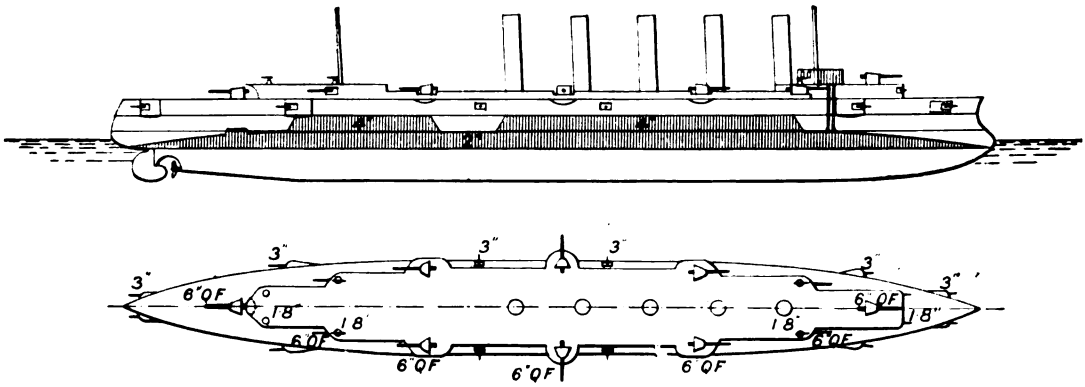
RUSSIA.

CRUISERS.

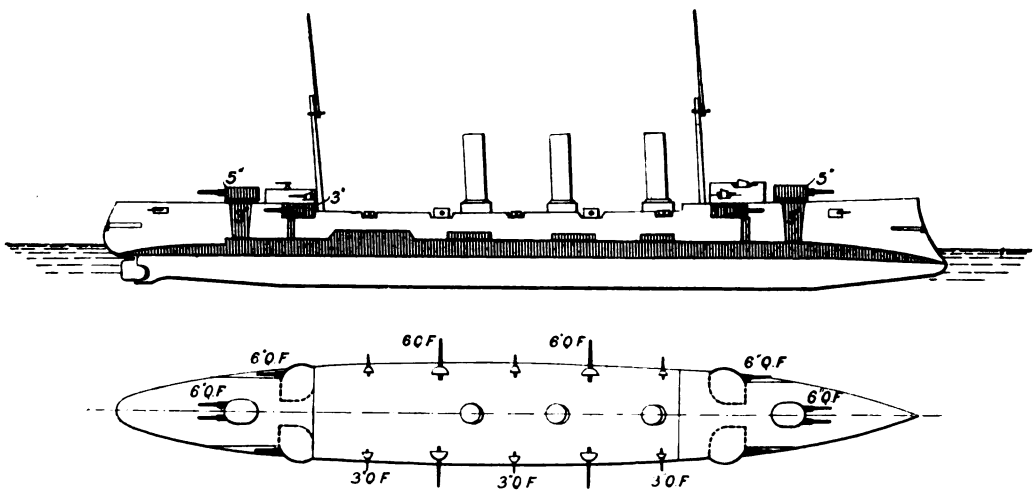
Askold.



Length, 426 ft. ; 5905 tons ; Speed, 23·8 knots ; Completed, 1901 ;
Armament, 12—6 in., 12—3 in., 12 small.

See page 257.

Bogatyr. Oleg.



Length, 417–440 ft. ; 6645–6675 tons ; Speed, 23–24 knots ; Completed, 1902–1904 ;
Armament, 12—6 in., 12—3 in., 10 small.

See page 257.

PLATE 52.

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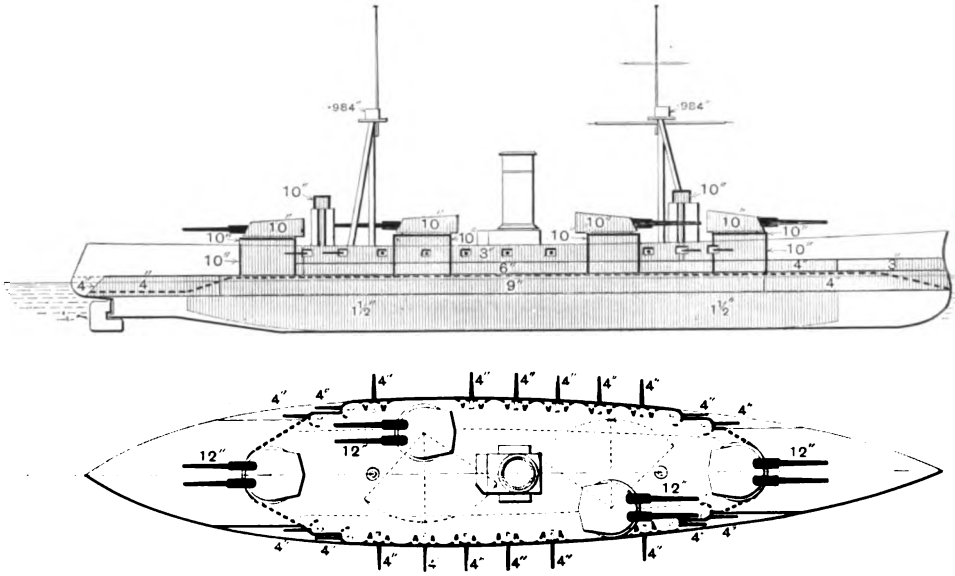
SPAIN.

BATTLESHIPS.

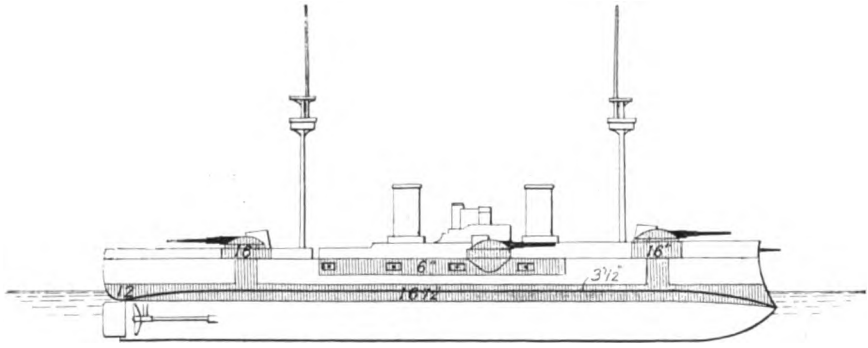
Alphonso XIII. **España.** **Jaime I.**

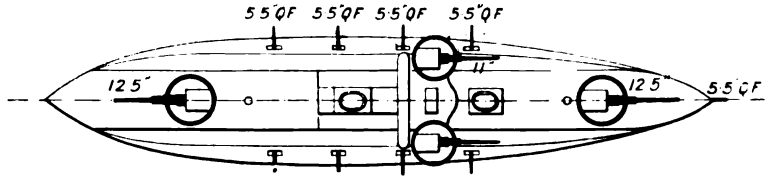


Length, 435 ft. ; 15,460 tons ; Speed, 19·5 knots ; Building ;
Armament, 8—12 in., 20—4 in., 6 small.

See page 200.

Pelayo.





Length, 330 ft. ; 9744 tons ; Speed, 16 knots ; Completed, 1890 ;
Armament, 2—12·5 in., 2—11 in., 9—5·5 in., 18 small.

See page 200.

PLATE 53.

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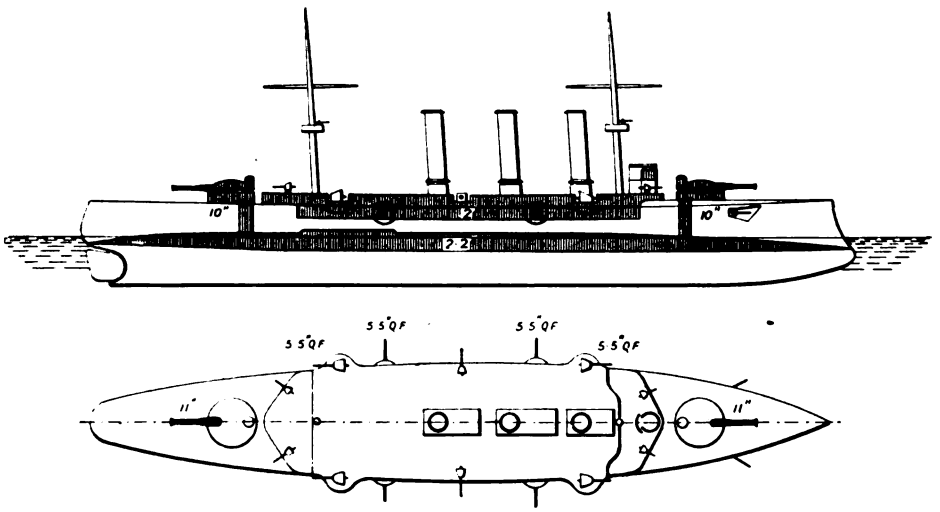
ARMOURED CRUISER.

Emperador Carlos V.



Length, 389 ft. ; 9089 tons ; Speed, 20 knots ; Completed, 1898 ;
Armament, 2—11 in., 8—5·5 in., 4—3·9 in., 12 small.

See page 260.

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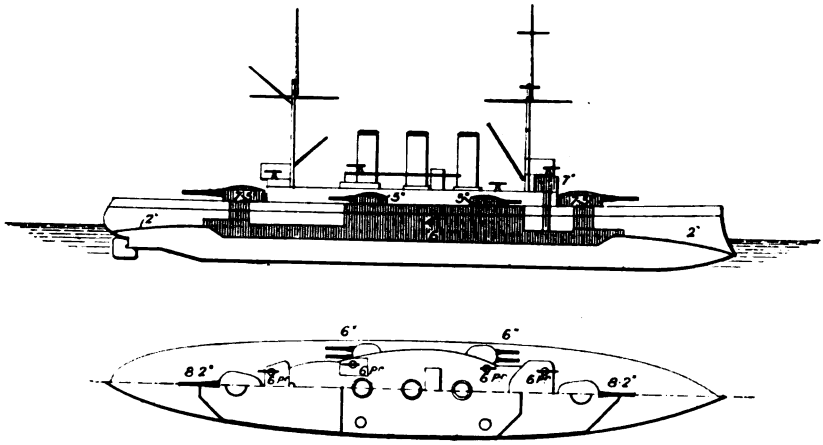
SWEDEN.

BATTLESHIP.

Oscar II.

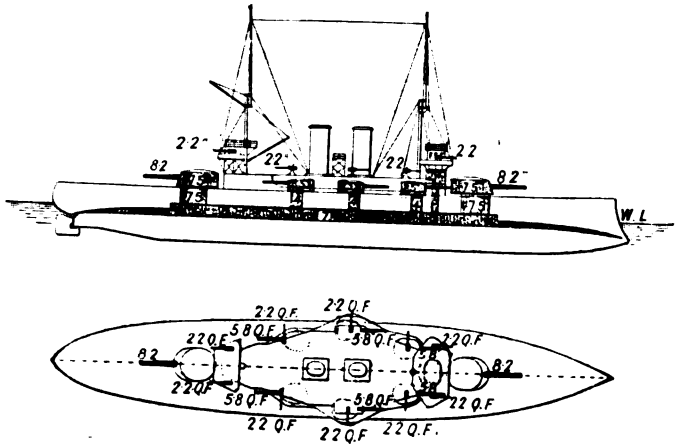


Length, 314 ft. ; 4203 tons ; Speed, 18 knots ; Completed, 1907 ;
Armament, 2—8·2 in., 8—6 in., 14 small.

See page 262.

COAST DEFENCE SHIPS.

Aeran. **Manligheten.** **Tapperheten.** **Wasa.**



Length, 287 ft. ; 3612 tons ; Speed, 16·5–17·2 knots ; Completed, 1901–1908 ;
Armament, 2—8·2 in., 6—5·8 in., 14 small.

See page 262.

PLATE 55.

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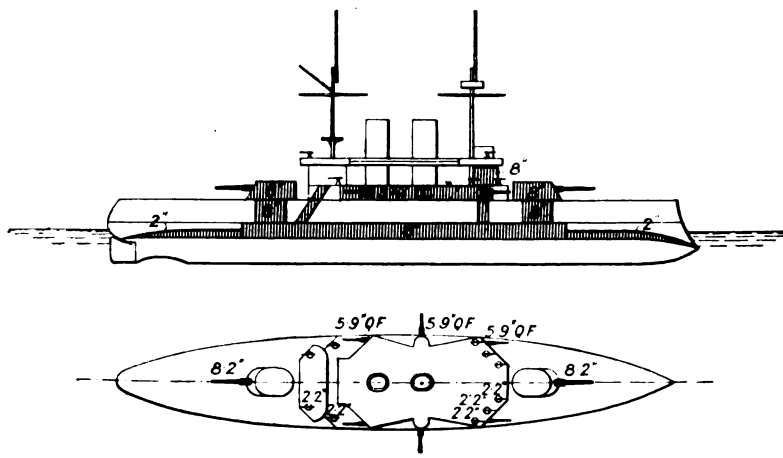
SWEDEN.

COAST DEFENCE SHIP.

Dristigheten.

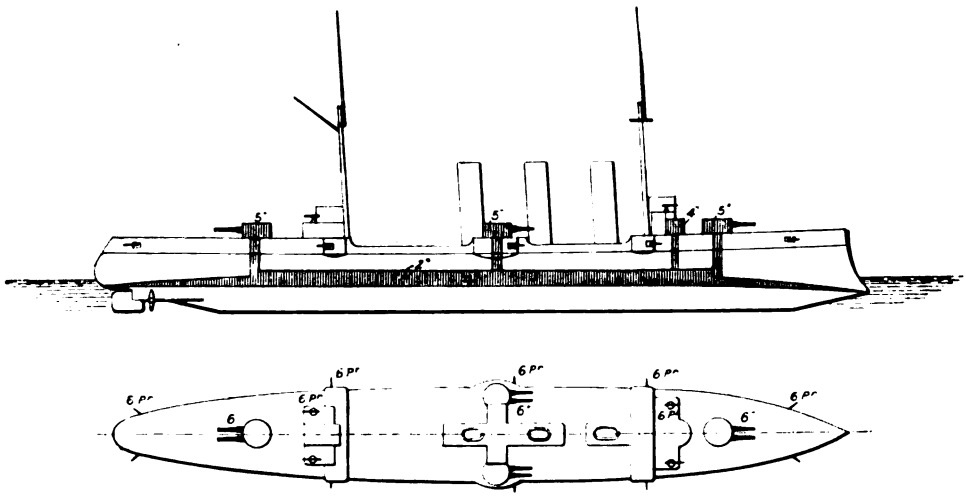


Length, 285 ft. ; 3445 tons ; Speed, 16·5 knots ; Completed, 1901 ;
Armament, 2—8·2 in., 6—5·9 in., 12 small.

See page 262.

ARMOURED CRUISER.

Fylgia.



Length, 377 ft. ; 4700 tons ; Speed, 22·5 knots ; Completed, 1907 ;
Armament, 8—6 in., 17 small.

See page 262.

PLATE 56.

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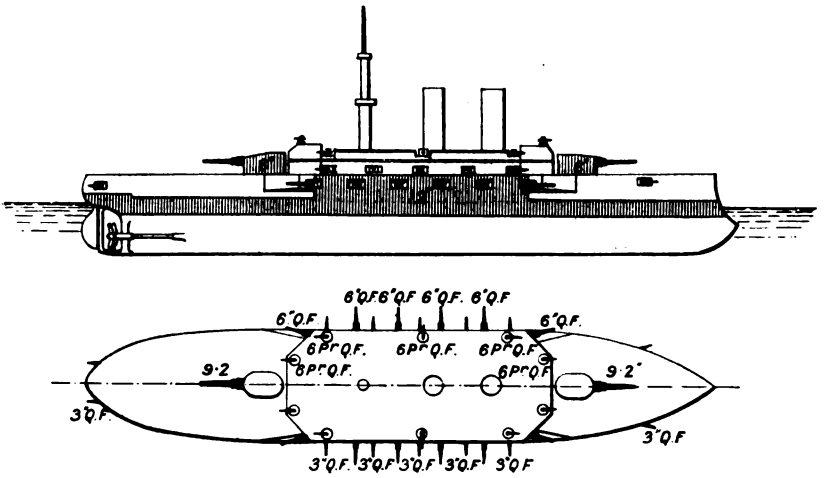
TURKEY.

BATTLESHIP.

Messoudieh.

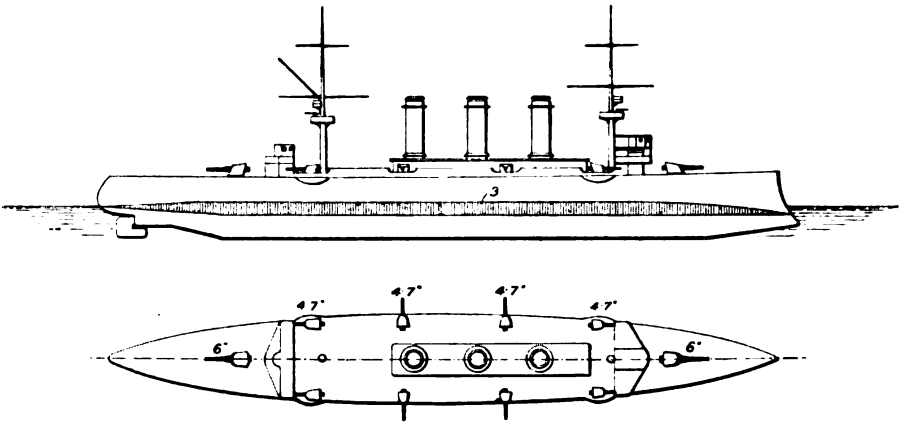


Length, 331 ft.; 9120 tons; Speed, 17·5 knots; Completed, 1901;
Armament, 2—9·2 in., 12—6 in., 14—3 in., 14 small.

See page 264.

CRUISERS.

Abdul Hamid. Medjidieh.



Length, 331—340 ft.; 3432—3800 tons; Speed, 22·2 knots; Completed, 1904;
Armament, 2—6 in., 8—4·7 in., 12 small.

See page 264.

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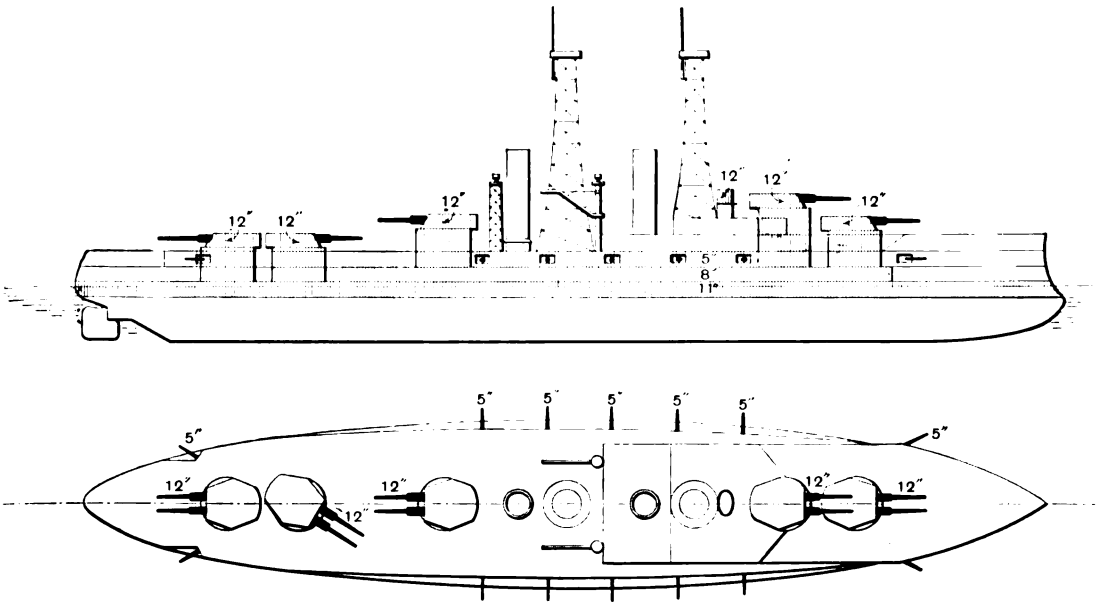
UNITED STATES.

BATTLESHIPS.

Delaware. **North Dakota.** **Florida.** **Utah.**

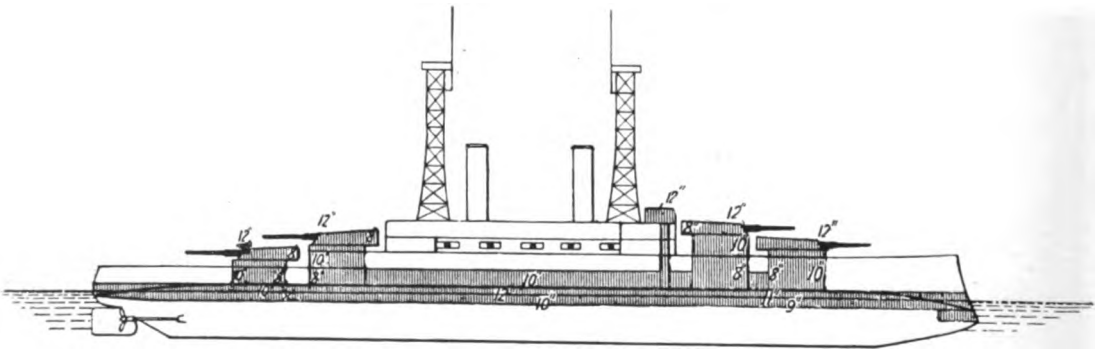


Delaware } Length, 510 ft. ; 20,000 tons ; Speed, 21·5 knots ; Completed, 1910 ;
North Dakota } Armament, 10—12 in., 14—5 in., 16 small.

Florida } Length, 510 ft. ; 21,825 tons ; Speed, 21 knots ; Building ;
Utah } Armament, 10—12 in., 16 -5 in., 10 small.

See page 265.

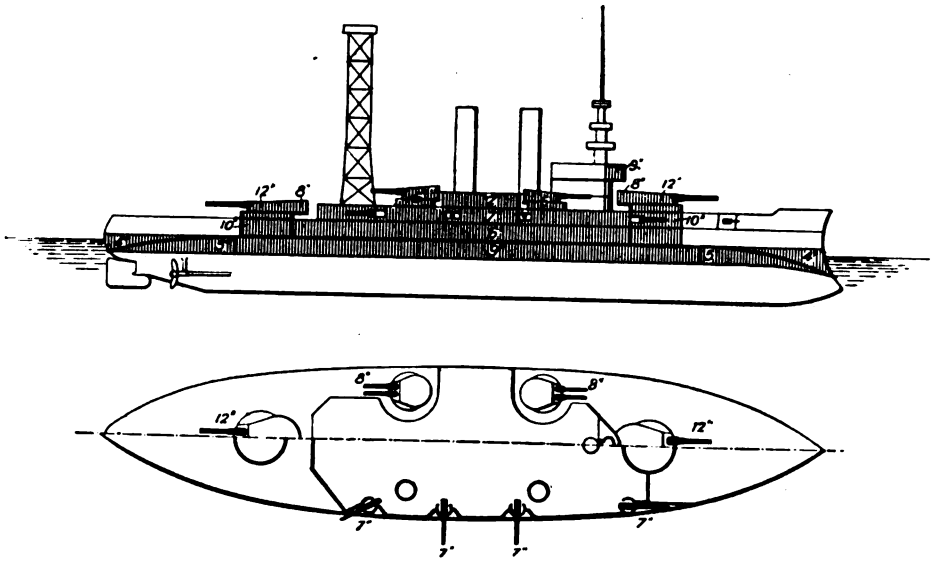
Michigan. **South Carolina.**


12″
12″
12″
12″
12″
12″
10″
10″
10

UNITED STATES.

BATTLESHIPS.

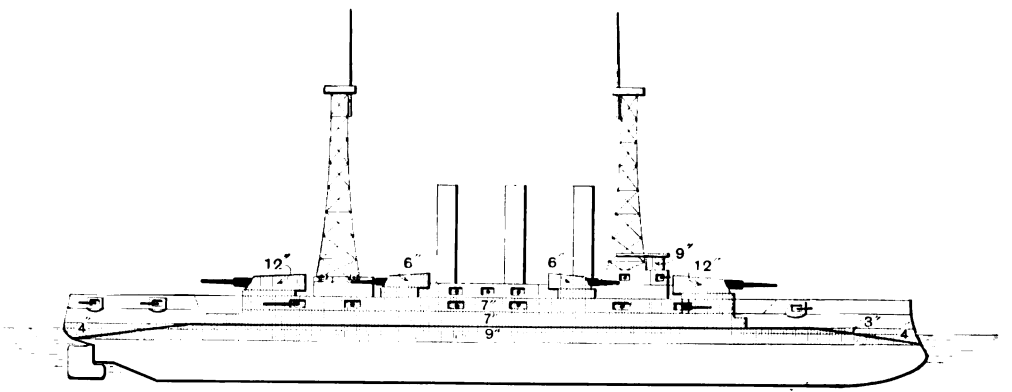
Idaho. **Mississippi.**

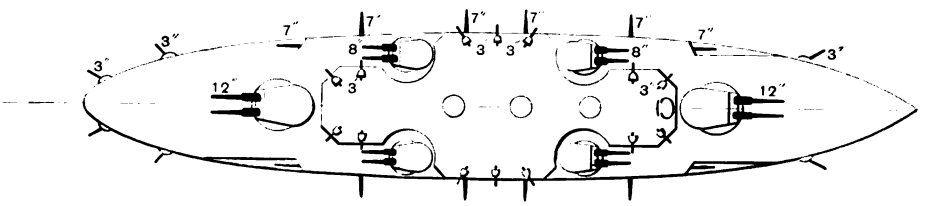


Length, 375 ft. ; 13,000 tons ; Speed, 17 knots ; Completed, 1900 ;
Armament, 4—12 in., 8—8 in., 8—7 in., 12—3 in., 20 small.

See page 265.

Connecticut. **Kansas.** **Louisiana.** **Minnesota.** **New Hampshire.** **Vermont.**





Length, 450 ft. ; 16,000 tons ; Speed, 18·1—18·8 knots ; Completed, 1906–1908 ;
Armament, 4—12 in., 8—8 in., 12—7 in., 20—3 in., 30 small.

Connecticut and Louisiana have 11 in. belt instead of 9 in., and have only 2—3 in. guns at the stern. New Hampshire has two military masts in place of the towers. Minnesota has one mast and one tower.

See page 265.

PLATE 59.

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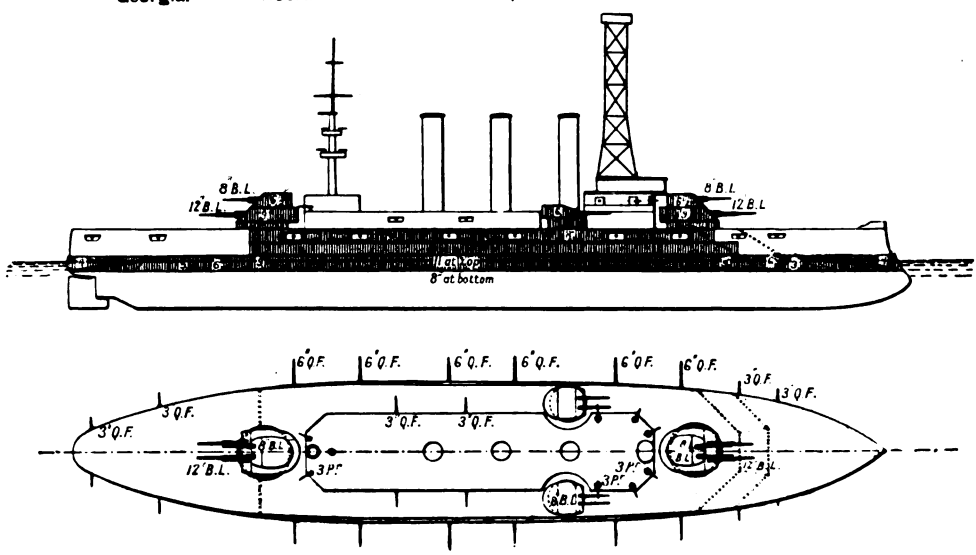
UNITED STATES.

BATTLESHIPS.

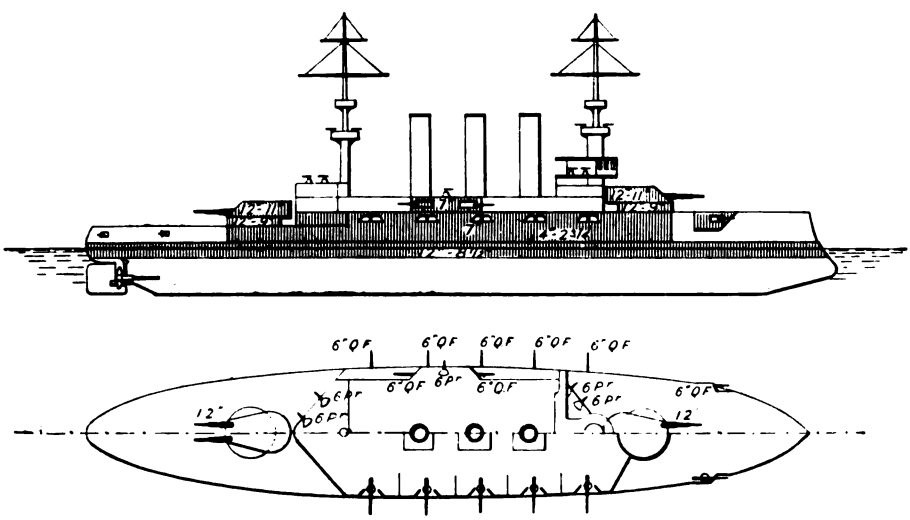
Georgia. Nebraska. New Jersey. Rhode Island. Virginia.



Length, 435 ft.; 14,948 tons; Speed, 19—19·4 knots; Completed, 1905-1906; Armament, 4—12 in., 8—8 in., 12—6 in., 12—3 in., 30 small..

See page 265.

Maine. * Missouri. * Ohio.



Length, 388 ft.; 12,300—12,440 tons; Speed, 17·8—18·1 knots; Completed, 1902-1904; Armament, 4—12 in., 16—6 in., 6—3 in., 18 small.

* Have one lattice tower.

See page 266.

PLATE 60.

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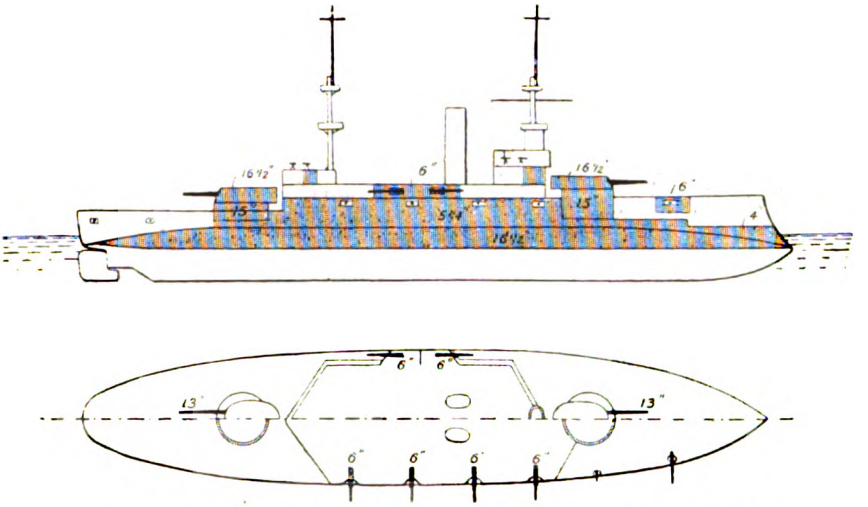
UNITED STATES.

BATTLESHIPS.

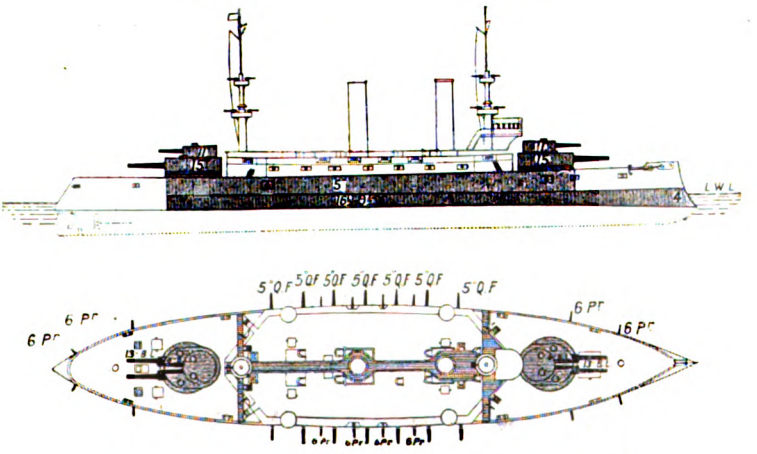
Alabama. **Illinois.** **Wisconsin.**



Length, 368 ft. ; 11,565—11,653 tons ; Speed, 17—17·45 knots ; Completed, 1900–1901 ;
Armament, 4—13 in., 14—6 in., 24 small.

See page 265.

Kearsarge. **Kentucky.**



Length, 368 ft. ; 11,540 tons ; Speed, 16·8 knots ; Completed, 1900 ;
Armament, 4—13 in., 4—8 in., 14—5 in., 34 small.

See page 266.

PLATE 61.

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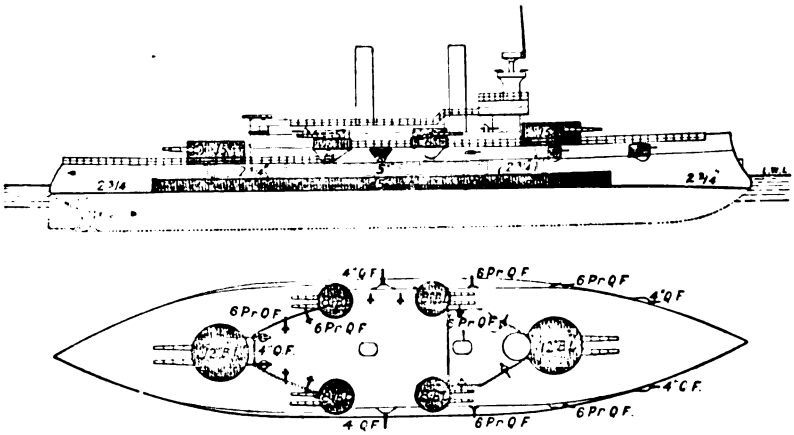
UNITED STATES.

BATTLESHIP.

Iowa.

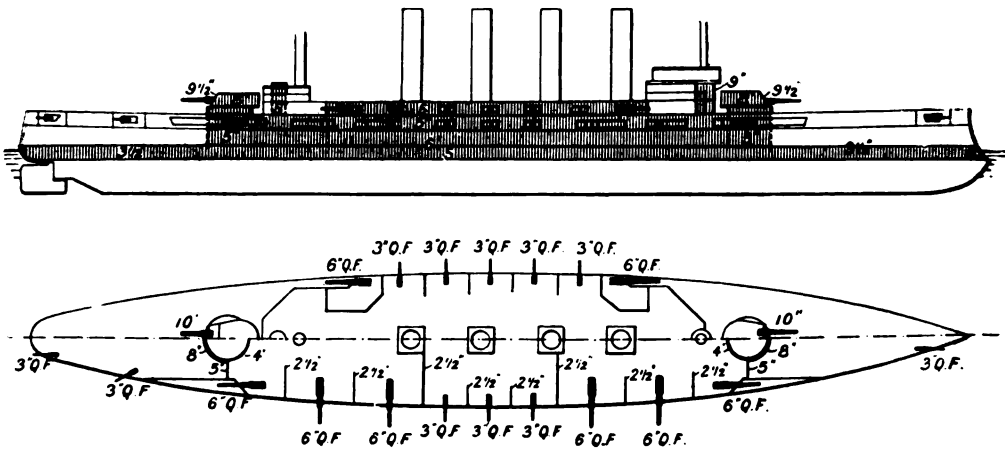


Length, 360 ft. ; 11,340 tons ; Speed, 17·1 knots ; Completed, 1897 ;
Armament, 4—12 in., 8—8 in., 10—4 in., 12 small.

See page 265.

ARMOURED CRUISERS.

Montana. North Carolina. Tennessee. Washington.



Length, 502 ft. ; 14,500 tons ; Speed, 22—22·8 knots ; Completed, 1906–1908 ;
Armament, 4—10 in., 16—6 in., 22—3 in., 22 small.

See page 266.

PLATE 62.

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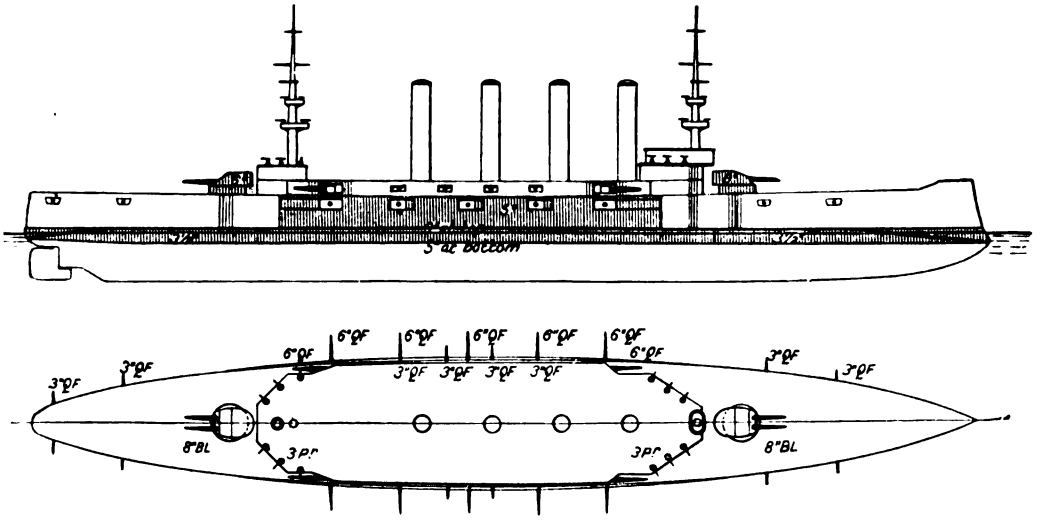
UNITED STATES.

ARMOURED CRUISERS.

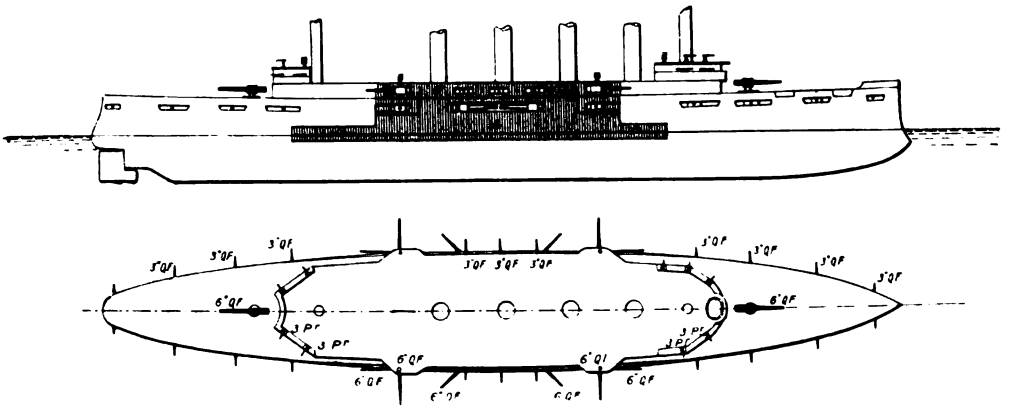
California. Colorado. Maryland. Pennsylvania. South Dakota. West Virginia.



Length, 502 ft. ; 13,680 tons ; Speed, 22—22·4 knots ; Completed, 1905-1907 ;
Armament, 4—8 in., 14—6 in., 18—3 in., 30 small.

See page 265

Charleston. Milwaukee. St. Louis.



Length, 424 ft. ; 9700 tons ; Speed, 22—22·3 knots ; Completed, 1906 ;
Armament, 14—6 in., 18—3 in., 36 small.

See page 265.

PLATE 63.
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PART III.

ARMOUR AND ORDNANCE.

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ARMOUR AND ORDNANCE.

British progress.

ALTHOUGH little progress of a definite character has been made in the direction of heavier guns for warship armament, it is clear that we are on the eve of important developments, and this despite the fact that in the battle between guns and armour the former is still the victor. Since the last issue of the *Naval Annual*, battleships with a greater weight of fire from the primary battery—though not in any case with a greater broadside fire—than that of the British Dreadnought class, have been completed for the navies of Germany, Japan, and Brazil. The vast differences between the weight of armament of the latest completed battleships of Britain and those of other Powers, which existed twelve months ago, have now, to a large extent, disappeared. Germany has four ships completed which mount twelve 11-in. guns, and double that number in hand which are to carry, according to latest information, twelve 12-in. guns. Japan has now in commission the Satsuma and Aki, with a mixed heavy battery of sixteen 12-in. and 10-in. guns, and at least two other vessels building to carry an armament similar to that of the German vessels under construction. The Minas Geraes has been completed for Brazil, and this ship too is armed with twelve guns of 12-in. calibre. These developments in foreign ships were bound to be reflected at home if Great Britain was to continue to lead in the gun-power of her battleships.

Heavy guns.

The question has been much discussed whether the next step should be to increase the number of guns carried or their power. The latter course seems to be that favoured by the British naval authorities, though, owing to the strict secrecy observed, their actual intentions are not definitely known. With the possible exception of the Italian Dreadnoughts, no battleships mounting more than twelve guns of 11-in. or larger calibre are being built for foreign Powers, and those already completed which carry this number of guns will only be able to bring to bear eight of them on either broadside, or the same number as the original Dreadnought. Captain Persius, of

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the German Navy, wrote in the *Jahrbucher*, in September of last year, "It would be bad policy to arm vessels with a large number of guns at the expense of their calibre," and generally this view appears to be accepted. On the other hand, there are many indications that an increase in the calibre of the guns for the principal battery mounted in British ships is in contemplation, and it has been stated that the second quartette of ships of the 1909–10 programme will carry in place of a 12-in. gun the 13·5-in., which was described in the last issue of the *Naval Annual* as then under trial.

In September and October last experiments were carried out with a gun of this calibre mounted in the battleship Revenge, tender to the Whale Island gunnery school, with the obsolete battleship Edinburgh as a target, and both lyddite and capped A.P. shell were fired. Nothing was allowed officially to transpire as to the result of these tests, but the importance attached to them was evident, both by the precautions taken to maintain secrecy, and by the number of the ships engaged in the experiment. The construction of the gun and its penetrative power at long range are said to have passed the tests most satisfactorily. A 13·5-in. gun mounted in the Revenge was at this time fitted with a 10-in. inner tube for sub-calibre firing, in order to permit of the training of a number of men in the handling of the new weapon and its mounting.

Meantime three battleships of the St. Vincent class, mounting the new pattern 12-in. gun of 50 calibres, have been completed and commissioned, after having carried out satisfactory gun mounting trials. It was in the earlier design of this 12-in. gun that a want of circumferential strength—not girder strength, as was misstated in the *Naval Annual* of 1909—became manifest on trial, inspiring the German criticism that we were driven to the 13·5-in. calibre because of the wire construction of our guns making it impossible to lengthen them. But the design, as completed, exhibits no such weakness, and it is satisfactory to note that no delay has been experienced in the supply of these improved 12-in. guns. Since the delivery of the earlier batch others for use in the Neptune have been manufactured and despatched to Woolwich by Messrs. Beardmore and Co., a new recruit to the list of British firms engaged in heavy gun manufacture. The first 12-in. turned out by the firm, the first big gun ever manufactured in Scotland, left the Parkhead Works on November 4, 1909, and was followed by a second in less than eight weeks. All the processes of manufacture were carried out at Messrs. Beardmore's establishment—the casting of the steel ingots from which the different tubes were made, the tempering, shrinking, and machining of the parts, the wire winding, the boring, and the rifling, and the final

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finishing in the turning shop. It was reported in the *Glasgow Evening News* of December 22 that the second of these guns differed slightly from the first by reason of certain modifications, designed and introduced by Rear-Admiral Adair, a circumstance which was welcomed as an indication that the Admiralty had recognised the expediency of allowing private firms engaged in ordnance manufacture more scope for the introduction of improvements effected by themselves. A general description of the 12-in. of 50 calibres was given in last year's *Naval Annual*, and details appear in the Vickers' table of ordnance on p. 363.

Torpedo defence battery.

In regard to secondary armaments for torpedo defence, although no trials of new guns have been officially recorded, considerable development continues to be made towards improvements in this direction. Designs for an improved 6-in., and for several smaller calibre guns have been worked out, and the guns are in process of manufacture and trial. The wisdom of supplementing the primary battery of capital ships with a medium calibre gun—a method which has not entirely gone out of favour abroad—or holding to one class of big gun only, as is the British practice, continues to afford a field for discussion. In the new Argentine vessels a mixed battery of 6-in. and 4-in. is described as the torpedo defence armament, and the trend of expert opinion in foreign navies appears to be in the direction of such an armament, partly at least behind armour. Rear-Admiral Bacon, who in November gave up the post of Director of Ordnance to become the Managing Director of the Coventry Ordnance Works, had something to say on the subject in a lecture. An additional advantage, it is held, to be obtained with such a mixed armament is that the 6-in. guns could be used, if opportunity offered, in a fleet engagement as well for torpedo repelling purposes. The objection is made that to instal guns of this nature must necessarily restrict the fire of heavier ordnance, or the ship's displacement must be unnecessarily increased for the sake of an advantage which is problematical.

The torpedo-defence armament of the Neptune differs from that of her predecessors in the number and disposition of the guns. There are to be sixteen of these, all of the 4-in. B.L. pattern, or four less than the number carried in the St. Vincent class. These 4-in. guns throw a 31-lb. projectile instead of a 12·5-lb. projectile as thrown by the 3-in. guns mounted in the Dreadnought. It is reported also that some of them will be mounted in three armoured towers placed between four of the turrets. The tower placed forward will be immediately abaft the fore 12-in. turret, and in front of the port or forward turret of the two placed *en échelon*. The amidships tower comes

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between the two latter, and the after tower between the starboard beam turret and the foremost of the two after turrets, which, as already mentioned, is on a higher level than the corresponding turret in the Dreadnought, Bellerophon and St. Vincent designs. It is also reported that these three armoured towers will be connected by light bridges, giving the vessel an appearance quite distinct from that of her predecessors.

Lighter guns.

Upon this question of the torpedo repelling battery of British warships there appears to be a large body of opinion in favour of the installation of a more powerful gun than the 4-in. B.L. The matter was referred to at length in this section of the *Naval Annual* for 1909. Since then no definite developments have taken place. The 4·7-in. of a new type which was spoken of in this connection has not been adopted, and it is generally held that when another change is made at all it will be to a gun of larger calibre. On the principle, however, that rapidity of fire is of more importance against torpedo craft than power of penetration, such a change is not favoured by all naval men. Not only is it pointed out that a difficulty with heavier guns would be to dispose them effectively without interfering with the arcs of training of the principal guns, but the period during which the destroyer is within effective range is so short that, given adequate stopping power in each projectile, every effort should be made to throw as many as possible in that period.

It may be noted, in regard to this subject of anti-torpedo-defence-guns, that the Admiralty decided in May, 1909, to remove all 3-pr. Hotchkiss except one for use in boats from the Highflyer, Challenger, Talbot, and Arrogant classes of protected cruiser, the complements of these seventeen vessels being proportionately reduced. Nor has this 3-pr. gun been mounted in any cruiser or battleship since the Achilles and King Edward classes respectively. But the official view, as stated in June, 1908, was that "the 3-pr. Vickers, when suitably mounted, is considered adequate for repelling attack by modern destroyers and torpedo craft," and it has now been decided that the one 12-pr. gun mounted in the five original cruisers of the "City" class shall be replaced in the four Dartmouth type by four Vickers 3-pr. The main armament is also changed from two 6-in. and ten 4-in. to eight 6-in. guns, giving the newer vessels a total weight of armament from the 6-in. weapons of 800 lb., compared to the 450 lb. of the 6-in. and 4-in. guns in the Bristol and her sisters.

Both the 3-pr. Hotchkiss, Mark I., and the 3-pr. Vickers, Mark I., which replaced it, are quick-firers. The Vickers gun is semi-automatic:—the breech is opened by hand, and when the cartridge is entered the breech closes automatically by the rim of the cartridge

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pushing home the extractor, and thus freeing a strong spring which closes the breech. When the gun is fired, on running it out after recoil, gearing is actuated which opens the breech and extracts the empty cartridge. The breech is thus left open for the insertion of another round. The difference in weights, etc., of the two guns is as follows .—

	Weight			Length		Charge
	cwt.	qrs.	lbs.	ft.	in.	ozs.
3-pr. Hotchkiss	4	2	24	6	8	6⅜ cordite.
3-pr. Vickers	5	2	4	8	3	13⅜ M.D. cordite.

The projectiles weigh about the same, but the muzzle velocity of the Hotchkiss was 1920 f.s., while that of the Vickers is 2800 f.s. The latter has, therefore, a much flatter trajectory and greater penetrative power. The flatter trajectory is, of course, most valuable, but, as already said, many naval officers would prefer a larger bursting charge for stopping purposes.

Destroyers' guns.

In regard to destroyers also a notable advance in gun power has been made. The original boats of the Tribal class (Afridi) mounted three 12-pr., 12 cwt., q.f. guns, throwing an aggregate weight of 37½ lb. of metal, and since completion this armament has been strengthened by the addition of two more 12-pr. The later Tribal class boats (Amazon) were given an armament of two 4-in. B.L. guns, each firing a 25-lb. projectile, but in the sixteen boats of the 1908–9 programme (Beagle) only one 4-in. B.L. gun was mounted, the armament being completed by three 12-pr. In the latest boats actually under construction, those of the 1909–10 programme (Acorn), a mixed armament is also to be carried, but in different proportion, viz., two 4-in. and two 12-pr. The increase in the weight of metal thrown may thus be seen :—

Afridi	37½ lb., increased to 62½ lb.
Amazon	50 lb.
Beagle	62½ lb.
Acorn	75 lb.

The destroyers of the Beagle and Acorn classes, moreover, are fitted to carry the new 21-in. torpedo instead of the 18-in. weapon of the Tribal class.

Disposition of guns.

No general agreement has yet been reached as to the best method of disposition for the main battery of battleships and heavy cruisers. It is somewhat difficult to get at the facts as regards projected ships, or even recent designs in hand owing to the secrecy which is being exercised by the different Governments. In this country the *échelon* system, used in the Invincible class, has been adopted for the Neptune

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but with modifications permitted by the increased length of the vessel. This method has not been followed in foreign navies, where, as a rule, the greater advantage seems to be held to rest with an arrangement in which all the turrets are in one fore and aft line. This system, which has much to commend it, will, in all probability, be followed in the Orion design.

The Americans have in the later ships adopted the method of mounting all the big twin guns on the centre line, four of them firing forward, four firing aft, and the remaining two training through large angles on the broadside.

The Brazilians followed the older British practice to the extent of mounting two pairs of guns on the forward broadsides, but at the same time they have mounted the remaining four pairs, two forward and two aft, in such a way that they get direct forward fire from the four forward guns and direct aft fire from the four aft guns, and have also very large arcs of training on both broadsides.

In the ships to be built for Argentina the American practice has been followed, and 12 guns, twin mounted, will be carried. The two forward pairs are mounted on the centre line forward, two pairs mounted on the centre line aft, the first four firing directly forward and the second four firing directly aft, with large arcs of training on both sides. The remaining two pairs are also mounted on the upper deck amidships, but not on the broadsides; the centre of each barbette is brought to within about 12 ft. of the centre line on each side. By this means, whilst they have not a direct ahead and astern fire, they have exceedingly large arcs of training on both sides of the ship. This is considered of more advantage than ahead or astern fire, which they believe will be of little use in warfare.

The Russian battleships now under construction will also mount twelve guns, all on the centre line. These guns, however, are all to be triple mounted and the barbettes are so arranged that only three guns can fire forward and three aft, the remaining two barbettes being placed on the centre line amidships, firing through large arcs of training on both sides. The Russians, also, take the view that a big ahead and astern fire is of little use.

In the latest ships of the Italian Navy the guns are peculiarly arranged, some of them being triple mounted and some twin mounted so that in some of the ships building there are thirteen guns and in other vessels of the same class twelve. Here, again, the latest practice is to mount the guns on the centre line. In some cases there are four guns firing forward and four aft, and in other cases five guns firing forward and five aft.

In the new French ships it is understood that all the guns are

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not placed on the centre line, four at least being carried on the broadside.

In the Nassau type the Germans have almost gone to the other extreme, for they have placed two turrets on each broadside, twin mounted, so that with the bow and stern turret guns, while they get a forward fire of six guns and the same number aft, only eight guns out of the twelve can be fired on the broadside. In the Helgoland type it is understood that, by using the *échelon* method of placing the turrets, the broadside fire has been augmented.

Up to the present the British authorities have gone in for a smaller number of guns, namely, ten, and these they preferred to mount in three pairs on the centre line, one pair firing forward and two pairs firing aft, putting the remaining two pairs on the broadside forward, but capable of firing right forward and right aft. This plan, of course, limited the number of guns which can be fired on one broadside to eight, whereas by the American system all the twelve guns carried can be fired on each broadside. As already stated this arrangement has already been modified in the Neptune design, the two beam turrets being placed *en échelon* in order to permit of all guns being fired on either broadside. The system has its advantages, but it is not considered the best by many artillerists. The most obvious objection is that the arc of training of the guns when firing across the deck is comparatively small. This defect may be outweighed by the advantage of an extra pair of heavy guns on either broadside. The Neptune was not designed until after the Indomitable and the Inflexible had carried out their gun trials, and the former especially underwent some severe tests, the guns being fired on extreme bearings, and with the utmost elevation and depression. A further innovation in the Neptune—introduced it is said in consequence of the adoption of the *échelon* system—is the raising of the middle of the three turrets on the centre line of the ship. It has been explained that this has been done not to allow its guns to be fired over those of the turret immediately below, but in order to clear the fire of the wing guns when it is necessary to fire these at the extreme angles. Partly for the same reason, but also to increase the arc of fire, the two turrets *en échelon* in the Indefatigable and her successors, the Lion and Princess Royal, have been placed wider apart than those in the original Invincibles, the two centre-line barbettes being further from the midship point in the ship.

Manifestly from this summary the different nations have drawn different conclusions from the experiences of the last war as to the best disposition of the big guns; but, as was explained in last year's *Naval Annual*, the advantage of keeping the turrets on the centre-

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line of the ship is bound in time to make itself felt, and it is possible that changes in other elements of efficiency may contribute to make this easier of attainment.

Heavy gun-mountings.

As recent revelations have shown, the adoption of the all-big-gun armament for battleships and armoured cruisers, with the consequent large increase in the number of the heaviest gun turrets and mountings required, has drawn attention forcibly to the resources of British manufacturers for the supply of these parts of warship equipment. It is now more clearly realised than formerly that the period of construction for a large armoured vessel is to a great degree dependent upon the prompt and adequate provision of her gun-mountings. At the present time, the only firms engaged in the manufacture of gun mountings and accessories are those of Armstrong, Vickers, and the Coventry Works. As to the capacity of output of the first-named firm, Sir Andrew Noble, the company's chairman, stated in April, 1909, that "from our Elswick yard alone we could, if need be, deliver three Dreadnoughts complete in two and a half years from the date of order, and could further continue delivering at the rate of three vessels each fifteen subsequent months, while, with the assistance of our Openshaw works, we should have no difficulty in supplying and completing their armaments without interfering with such armaments as we may be making for other Powers." The capacity of the Vickers establishments was summed up by Colonel Vickers in the previous month as follows:—"The firm could lay down and complete, arm, and fit ready for service in every respect three battleships of the Dreadnought type in three years from the date of approval of drawings without going outside its own factories. Thereafter their firm could deliver Dreadnoughts complete for service at the rate of one in every six months, in addition to existing contracts," and to current orders for different classes of smaller vessels. The firm could supply the artillery equipment complete for seven Dreadnoughts in three years. Their power of production of guns and armour considerably exceeded this, so that they could provide guns and armour for ships built in Government and other yards. The Coventry Works, which are associated with the firms of John Brown, Cammell Laird, and Fairfield, are now in a position to undertake the supply of the largest calibre of naval guns, in addition to the mountings of two and half battleships per annum, after thirteen months from the receipt of order. Nor does this limit the capacity of these firms, so far as the Armstrong and Vickers works are concerned, since their resources are known to have been increased since the statements of Sir Andrew Noble and Colonel Vickers were made. As mentioned

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elsewhere, the Beardmore firm will also shortly be in a position to turn out the heaviest gun mountings.

Electric gun mountings.

Attention was further directed to the question of gun-mountings by statements made in Parliament and elsewhere in connection with the electrically-operated mountings of the Invincible. The electrical gear used in this ship was an experiment, meant to establish the relative values of hydraulic and electrically-worked turrets. The naval authorities no doubt considered that the only way to establish this point completely was to have a ship fitted with electrically worked turrets. Electric turrets have been made for foreign ships in this country, but the machinery supplied, although perfectly efficient, would not satisfy a navy accustomed to hydraulic turrets. The Admiralty, to make their experiment complete therefore, were determined that the specification which was to govern the manufacture of the electric turrets should insist on all the details which experience has shown can be, with advantage, used with hydraulic gun mountings. Such an experiment had never before been made in any navy, and it is not to be wondered at that adjustments were found to be necessary after the ship's crew had worked the guns.

It will be remembered that Mr. McKenna stated that the guns of all the turrets could have been fired at any time, but that during a certain period the rate of firing from two turrets would have been less than that obtained from ordinary hydraulic turrets. This is a perfectly true statement, and it may be added that the difference in rate would have been very small. In action, probably, there would have been no difference in the rate, as firing in action can hardly be expected to be as rapid as firing at ordinary practice. So far the experiment in the Invincible appears to have confirmed the Admiralty as to the expediency of retaining, for the present, hydraulic mountings generally for the Service. Indeed, Mr. McKenna, during the debate on the Supplementary Navy Estimate on March 2, 1910, stated in reply to Lord Charles Beresford that the guns and gun-mountings of none of the new ships under construction will be actuated by electricity.

Although no striking improvement has been made in the matter of the hydraulic mountings of the larger calibre guns, opportunity has been taken to bring the older types of 12-in. mountings up to modern requirements, and the progress made in this direction has resulted in increased accuracy of fire.

Improvements in breech mechanism.

It is becoming generally recognised that for torpedo attack, guns should be used capable of great rapidity of fire. With this object in view, semi-automatic guns are being introduced, varying in size from 3-pr. up to 4-in., the latter firing a 31-lb. projectile. These guns are

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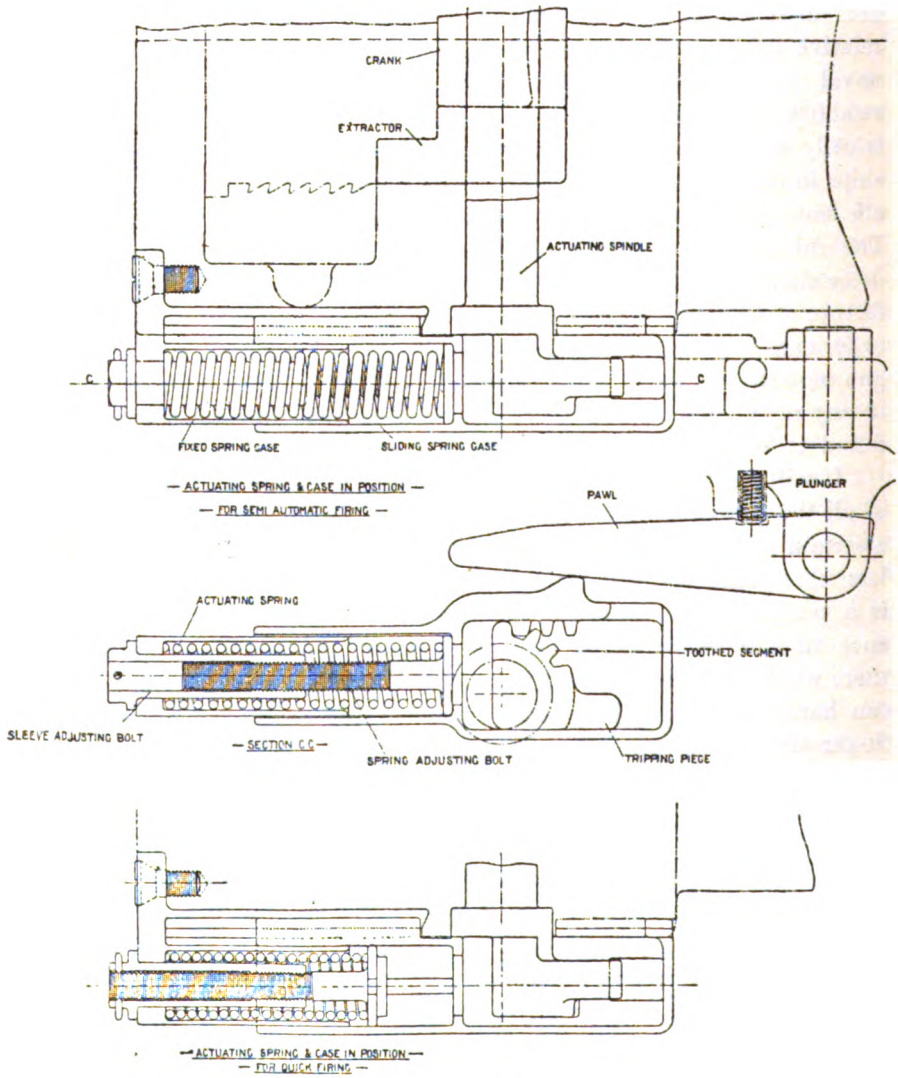
VICKERS' 4-IN. BREECH MECHANISM.



ACTUATING SPRING AND CASE.

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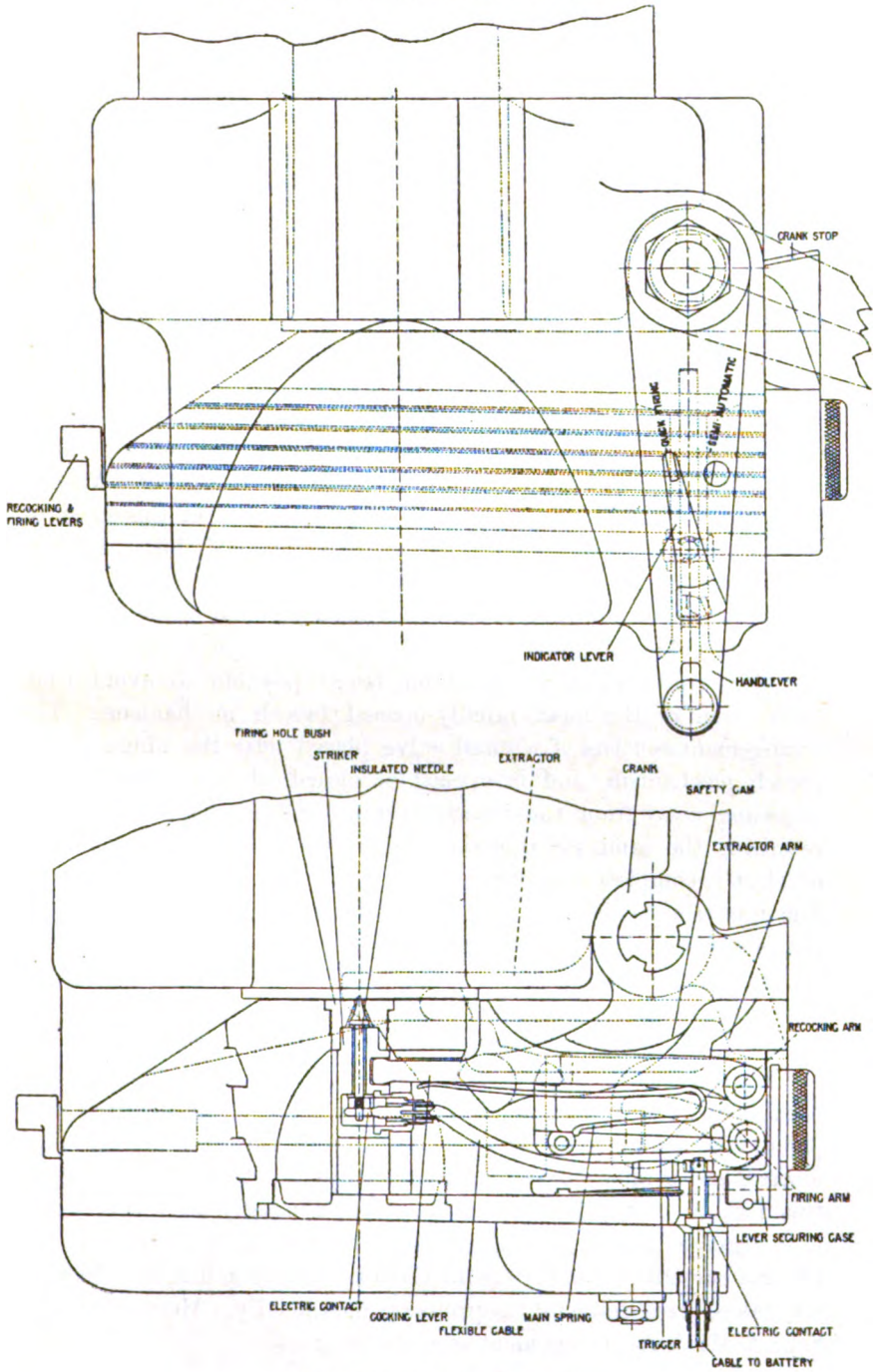
VICKERS' 4 IN. BREECH MECHANISM.



HORIZONTAL BLOCK MECHANISM.

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capable of firing from twenty in the heavier to thirty rounds per minute in the lighter guns, and form a valuable asset in the equipment of battleships and smaller vessels for the purpose of repelling torpedo attack.

Although for the various sizes of guns there may be differences in construction and detail, the general principle observed in these mechanisms is the same. That for the 12-pr. gun has been already fully described in the *Naval Annual*, 1906, page 322. The same general principles have been observed in later patterns. In all cases the breech is closed by a sliding block or wedge. In the smaller guns, this is usually vertical, but in the larger guns, such as 4-in., the breech mechanism, of which illustrations are given on pages 304 and 305, it is preferably made horizontal. In all sizes, the breech block is automatically withdrawn across the face of the breech opening by the actuating gear when the gun is running out after recoil, and is closed by the cartridge case when loading. Messrs. Vickers, Sons & Maxim have made a special study of this class of ordnance, and produced most successfully guns of this nature in several calibres.

Air blast as a means of avoiding back-flash in guns of small calibre.

An arrangement of air blast has been adopted which is peculiarly suitable for guns of small calibres, from 6-in. downwards. By this arrangement it has been found possible to avoid back flash, even in the most rapidly-opened breech mechanisms. The arrangement consists of a small valve placed near the hinge of the breech mechanism, and is opened or closed when the mechanism is swung away from the breech opening, and is closed by slightly returning the same towards the breech. Consequently the amount of blast is completely under the control of the mechanism operator. The apparatus is characterised by simplicity of construction and does not in any way interfere with the ordinary operation of the breech. In the main, this apparatus has been applied principally to obturator guns, but with certain modifications it can be applied to case guns, and has been adapted to suit the requirements of semi-automatic mechanisms.

Simultaneous electric and percussion gear.

A novel feature in the manufacture of breech mechanisms has been introduced by the application of a simultaneous electric and percussion firing lock. In conjunction with this lock a combined electric and percussion primer must be used. The special feature of this lock is that although electric firing is mainly used, this device is so arranged that it will always, in the event of the failure of the electric current or damage to the circuit whereby a missfire electrically takes place, detonate the primer percussionally. Messrs. Vickers, Sons & Maxim's arrangement is as follows:—

The first movement of the hand-lever of the breech mechanism

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causes the retraction of the electric needle, together with the percussion striker, prior to any movement of the locks or of the breech screw. During the subsequent movements of the breech mechanism the lock is opened and the striker fully cocked automatically. When the mechanism is returned to closed position, the electric needle only is permitted to come into contact with the primer head, the percussion striker being retained in fully cocked position by the trigger. The same movement of the pistol grip by which electric contact is made, releases the percussion striker, and permits it to fly forward and strike the needle, thereby making sure of firing percussionally in the event of electrical failure. As these locks are fired from the pistol grip on a stationary part of the mounting, a mechanical firing arrangement is necessary to connect up the pistol grip to the percussion striker.

Automatic guns and mountings.

In connection with automatic rifle calibre guns, great progress has been made in this branch of ordnance. Messrs. Vickers, Sons & Maxim have introduced a lightened pattern machine gun, the weight of which is only 26 lb., as compared with the present Service Maxim gun, which weighs 60 lb. The action of the gun is on exactly the same principle as the Service Maxim gun, and it is arranged so that it can be mounted on any of the existing Service mountings.

The reduction in weight has been obtained by a reconstruction of the mechanism, whereby the size of the casing has been reduced, and the parts of the gun which were originally made of gunmetal replaced by parts made of high-class steel. A new design of tripod mounting has been constructed for this gun, the said mounting being so arranged that the gun can be raised or lowered by turning a handle on the right-hand side of the mounting, which can be done without the gunner exposing himself. With this mounting it is possible for the gunner to fire the gun, when sitting on the seat of the tripod or kneeling, or lying down on the ground, thus enabling him to take advantage of any cover which may be available. The weight of this tripod is only about 34 lb., consequently the weight of the total equipment is about the same as the weight of the Service Maxim gun alone. This enables the gun and tripod to be easily transported, and renders the equipment most convenient for landing service. For this purpose specially constructed carriers have been designed for carrying the same on men's backs. The gun is carried by one man, who also carries a spare lock and the necessary tools. Another man carries the tripod, and a supply of ammunition is carried in similar carriers holding two boxes of 250 rounds each in belts. This forms a most convenient means of transport. A similar mounting has also been designed, but fitted with wheels, so as to enable the equipment

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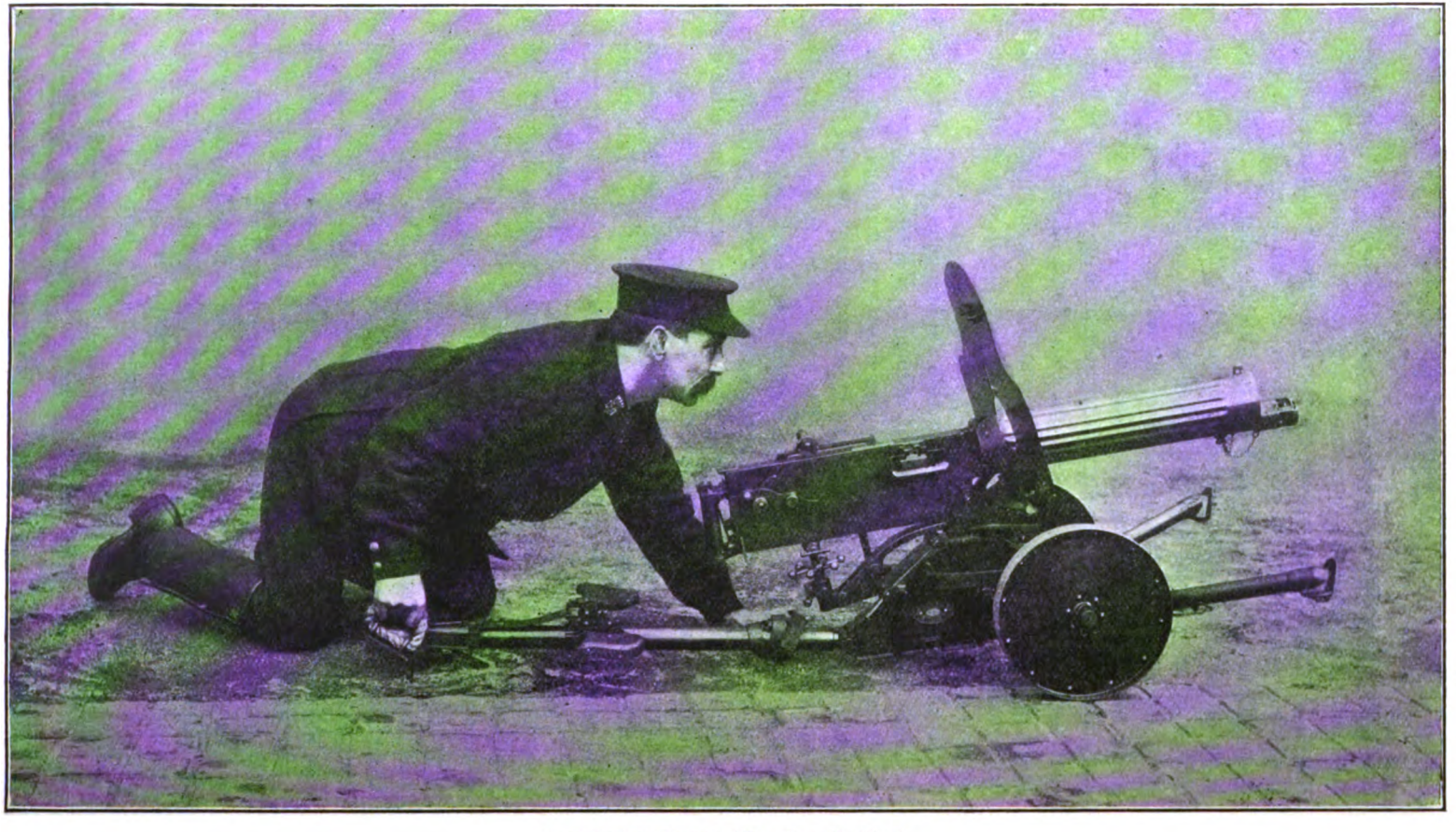

ADJUSTABLE TRIPOD (Crawling Position).

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to be dragged from one place to another. This form is illustrated on page 308. The top carriage is adjustable, so as to enable the gun to be kept in the horizontal plane even when the mounting is on sloping ground. By this adjustment it is possible to use the tripod on ground of any nature, as it can be used as a parapet mounting or an ordinary tripod mounting. The application of the wheels enables this mounting to be moved by the gunner in a crawling position, so that he can shift from one place to another without exposing himself. Vickers' adjustable mounting.

The Coventry Ordnance Works have also recently made considerable progress in the matter of gun mountings, and a number of these for 6-in., 4-in., and 12-pr. guns have been despatched from their works. They were all designed at the Coventry Works, and are similar in general principle.

The chief point of the 6-in. mounting is the arrangement of elevating gear and gunlayer's platform being connected to the cradle, so that when moving the gun the gunlayer remains at rest, the relative position of his feet and eyepiece of telescope remaining constant. This enables a more accurate and rapid laying to be maintained. In the 4-in. low velocity mounting, as the gun is elevated the recoil remains constant at all angles. This arrangement of absorbing the recoil and regulating the run up by means of valves has been found most successful both in field carriages and transferable mountings, the recoil being very steady and the run up equally so, giving no jerk so as to upset the laying. It is considered a great improvement on the usual method of the valve key with the controlling ram. Of these mountings, it may be said that the most striking innovation is the training gear, which is entirely enclosed in an oil-tight casing, the actuating parts working in a bath of oil which renders the training easy and smooth, and by a simple arrangement of the parts all back-lash due to wear can be quickly adjusted, the absence of which greatly facilitates the following of a moving target and improves the accuracy of fire. The elevating gear is a step in advance of previous practice. The actuating hand-wheels are duplicated with the handles at 180 degrees, similar to that adopted by the Bethlehem Company, and are attached to the cradle, the arc being fixed to the pivot, so that whether the gun is elevated or depressed the relative position between the elevating hand-wheels and the eye-piece of the telescopes remains constant, allowing of more accurate laying in a sea-way. This principle is carried still farther in mountings of 6-in. calibre and upwards; not only are the elevating hand-wheels secured to the cradle, but also the gunlayer's platform, so that when once the elevation for range has been set the gunlayer remains stationary for all positions of the gun due to the roll of the ship, it only being

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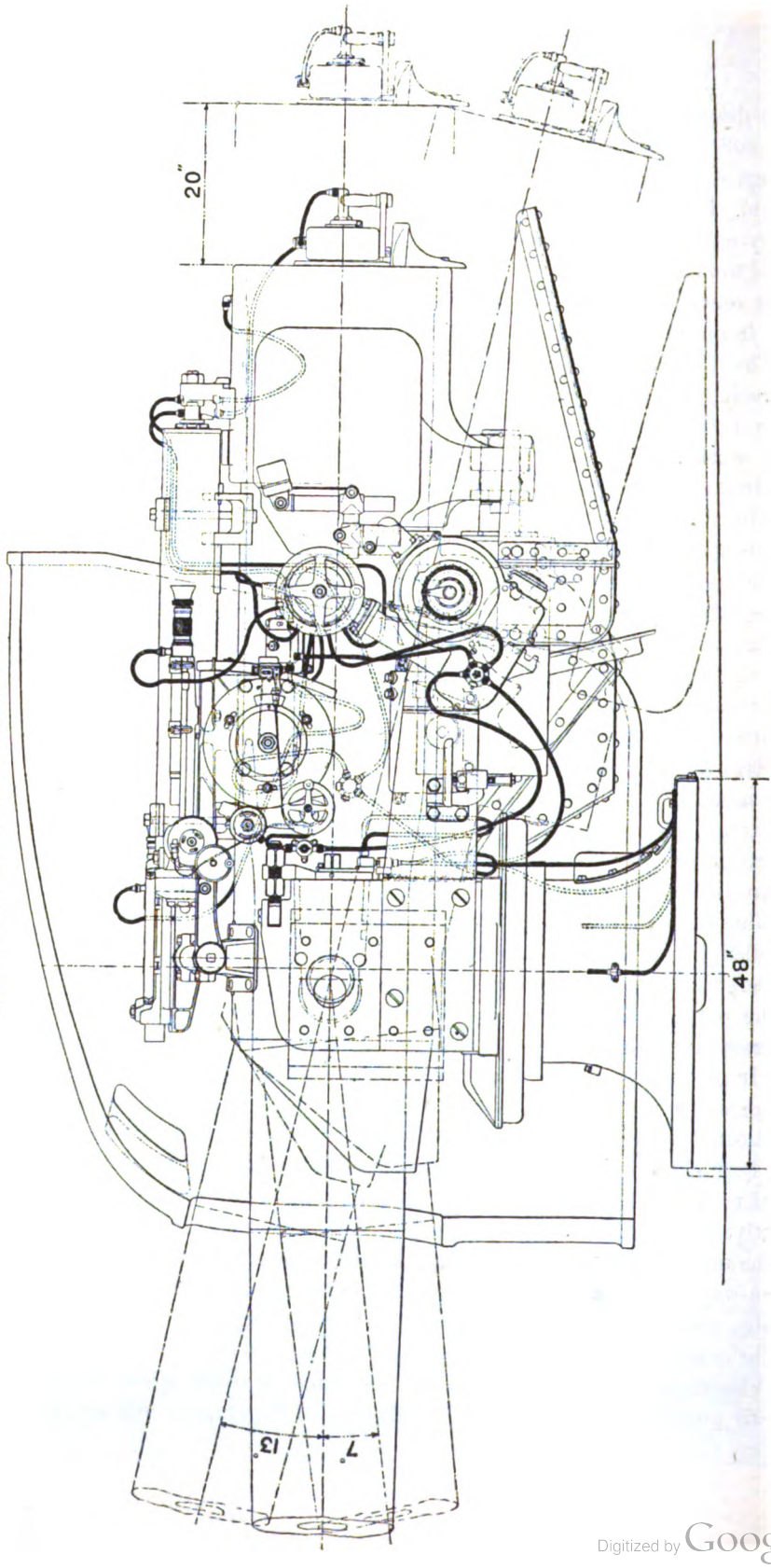

6-IN. GUN ON PEDESTAL MOUNTING.

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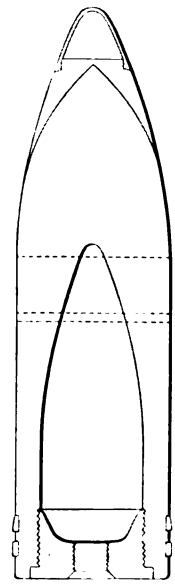
necessary for him to work the double-handed elevating gear to retain the sights on the target. This mounting is illustrated on page 310. The trials carried out with this design have been very successful.

Projectiles.

During the past year the general tendency in the manufacture of projectiles for the attack of armour, both hard-faced side armour and also deck armour, has been decidedly in the direction of increasing the capacity of the projectiles, not so much in respect of their penetration of armour as in the weight of the bursting charge which they will contain. During 1909 Messrs. Firth and Sons got out several types of projectiles for this purpose, and their latest design of projectile will contain 4½ per cent. of its total weight of a bursting charge consisting of trotyl, which is a very considerable advance on recent years, where the bursting charge has rarely exceeded 2½ or 3 per cent. A sketch of a projectile containing a bursting charge of this weight appears on this page. These projectiles are mainly for the attack of hard-faced armour, and they will penetrate, without breaking, a plate approximately one calibre in thickness.



Firth shell with large bursting charge.

Other projectiles contain as much as from 7 to 10 per cent. bursting charges, and can be used against thin deck armour or hard-faced side armour, but the walls of these projectiles are so thin that the projectile usually fractures when passing through a thick plate; nevertheless, as the base containing the fuse commonly remains intact the charge is actually detonated, and the fact that the shell walls themselves are fractured does not appear to be in any way detrimental to the explosive effect.

In some projectiles Messrs. Firth are advocating the system of double-ring driving bands, which, they believe, give more accurate shooting, owing to the better distribution of the bearing surfaces of the copper bands. It necessitates a small shot chamber in the gun, and has the advantage of placing the stop of the projectile in such a position that it is less affected by the erosion of the bore. The projectile in ramming is brought to rest in the same position in each consecutive round.

The introduction of heavy armour-piercing shells for use with coast defence howitzers has engaged the attention of the projectile manufacturers, and illustrations are given on page 312 of these projectiles to be used in perforating armoured decks. At present projectiles

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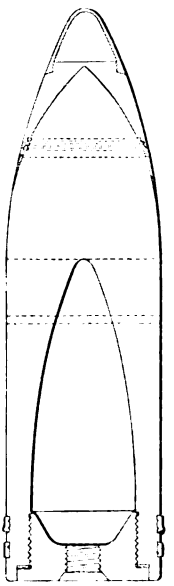
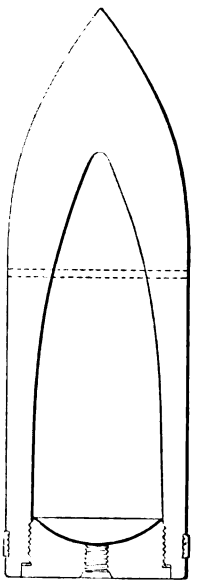
for heavy guns can easily perforate the thickest armour on board any warship now afloat, at any reasonable range. The standard of accuracy of manufacture of projectiles has been greatly improved of recent years, which has greatly facilitated accurate shooting. The introduction of projectiles with heads struck with a radius of more than two calibres is undoubtedly extending, and the old pattern of approximately flat-ended cap is practically obsolete.

Of other projectile manufacturers Messrs. Hadfield have for some time been occupied with orders for foreign Governments, and it is interesting to note that they have been entrusted by one Power with the manufacture of some of the largest armour-piercing shell yet



Firth 172·6 mm.
Capped A.P. shell.



Firth 293 mm.
Howitzer A.P. shell.

produced. These projectiles mark another advance in the attack of armour and in the development of big ordnance, and it will be interesting to see whether subsequent events demonstrate that the use of such large and heavy shell is, all things considered, commendable.

Armour. There has been practically no development in regard to the manufacture or use of armour since last year. The armour protection of the new ships of the Neptune and Orion types has not, of course, been made known, but the Vanguard and her sisters carry, it is now known, a belt of 10-in. thickness, or 1 in. less than the Dreadnought's belt, while the protection of the gun-positions is similarly less, being 9 in. and 5 in., instead of 11 in. and 8 in. The main-deck armour of

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the Vanguard is $\frac{3}{4}$ in. in thickness, compared with the $1\frac{3}{4}$ in. of the Dreadnought, and that of the middle deck is $1\frac{3}{4}$ in., as compared with $2\frac{3}{4}$ in.

Cordite.

In regard to the supply of cordite for the Navy, an official pronouncement upon this matter was made in the House of Commons by the First Lord of the Admiralty during the debate on the Navy Estimates on March 16th, 1910. Mr. McKenna was asked by Mr. Pretyman to give a distinct assurance that there was an adequate reserve of cordite in this country, and that the manufacturing capacity of firms supplying cordite was ample. In reply, the First Lord said that in consequence of a question which had been raised a few weeks previously, he took the earliest steps to inquire, and he was assured that the statement made was devoid of all foundation, that our cordite reserves were quite satisfactory, and that no difficulty was anticipated in meeting all naval requirements. He gave this assurance on the authority of the experts. On being further asked whether the assurance applied also to the power of output, and whether the capacity of output was equal to any war requirements within a year, the First Lord said that there was an adequate supply, the manufacturers had competent means for supplying cordite for all the large guns, and the reserves were complete. In his Memorandum accompanying the Estimates for 1910–11, the First Lord stated that measures had been taken during the year which it was hoped might ensure greater regularity of ballistics than was obtained under the old conditions.

Fire-control.

Although the regulations for the battle practice of the Fleet have been modified with a view to still further assimilating the conditions to those which may be expected to obtain in action, our methods of fire-control are not yet held to be as successful as could be wished. This matter is one upon which the greatest reticence is observed. It is, however, known that more than one new system is under trial. While in principle every system must be more or less alike, there has been constant improvement in the instruments employed in the communicating appliances between the control station and the guns, and in the sighting of the guns themselves.

Of the various systems of fire-control for night work, it is said that none has yet been discovered that is wholly satisfactory. Indeed, there is not wanting expert opinion which holds that the big ship by her own exertions can never adequately defend herself against torpedo attack. It is this view, apparently, which led Rear-Admiral Bacon to predict that in the time to come every big ship will be accompanied by a flotilla of attendant torpedo craft.

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Improvements in telescopes for gun-sights.

During the last year no radical changes have been made in the design of gun-sights, but the telescopic portion of such sights has been closely investigated, and quite a number of minor improvements have been carried out which will tend to increase the accuracy of gun-fire, more so perhaps in time of war. The two patterns of telescopes formerly in general use have been dispensed with by many countries, and have been replaced by one pattern of telescope having a variable power of from 5 to 21, and fitted with an illuminating device making it equally suitable for day or night use, thus dispensing with the necessity of changing the telescopes and also reducing the cost of the equipment of a mounting. A new telescope, however, of a fixed low power, viz., 2½, has been adopted by one or two countries, and is called a "dirty weather" telescope. From its name it will be understood that it is specially adapted for use at sea in dirty weather, and by it objects can be detected wonderfully clearly in very foggy weather, and even in a blinding snowstorm, whereas they cannot be seen even in the slightest degree by the larger power telescopes. In order to reduce the amount of light entering the telescope so as to clear up the object and get better firing results, the object-glass end of the telescope is fitted either with a series of caps having varied sized holes or with an iris diaphragm which is well known in photographic work. Further, in order to remove the glare of a dazzling sun or a searchlight which may be switched on at night to upset the laying of the gunners, the telescopes are provided with coloured or smoked glasses, which may either be fitted to the object or eyepiece end of the telescopes as desired.

Torpedoes and mines.

The only reference to the subject of torpedoes in the Memorandum of the First Lord for 1910–11 is contained in the sentence that "the developments of the torpedo referred to last year have continued with most satisfactory results." These developments were referred to by Rear-Admiral Bacon in his lecture on "The Battleship of the Future," in the course of which he said :—

> The use of the torpedo during a fleet action can no longer be neglected. The improvements of late years in this weapon have been considerable. It has been very much the fashion to disregard the possible developments of this weapon. There is no doubt that of late years in America, on the Continent, and also at Messrs. Whitehead's, there have been introduced improvements into the torpedo which have totally altered the character and use of that weapon. It is not improbable that these improvements are merely in their infancy, and that before many years have elapsed we may find ourselves confronted with a weapon of considerably greater powers. If the range of the torpedo can be brought up to 6000 yards, it has great possibilities in an action.

The new torpedo factory at Greenock will, it was announced officially on March 31st, be completed by August 1st next. It is situated at Battery Park, in the west end of Greenock, and with frontage to the

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Firth of Clyde, on the opposite side of which is the new trial range at Loch Long. The sole power used both for lighting and other purposes will be electricity. The buildings of the factory cover an area of ten acres, and the transference of the torpedo manufactory from Woolwich will mean the addition of 700 skilled workmen to the population of Greenock. The range at Loch Long is 700 yards in length, the area of land acquired by the Admiralty being 4·17 acres. Messrs. Whitehead & Co. are also negotiating for the establishment of a new torpedo-range in Weymouth Bay, their present one at Portland having been rendered inadequate to the needs of new developments in the range of torpedoes.

No results have been published of the torpedo prize-firing competition instituted by the Admiralty in 1908; but fleet torpedo practice is to be carried out this year.

Great attention has recently been paid to the mining service of the Navy, and the First Lord states in his Memorandum for 1910–11 that it was exercised during the manœuvres of 1909. In February last the cruisers of the Home Fleet fitted as mine-laying vessels were combined for exercises in the Channel, and in the following month the torpedo-gunboats to which a mine-sweeping apparatus has been given were similarly concentrated for experiments. In April, 1909, the Admiralty purchased a few steam trawlers at Grimsby for duty in sweeping submarine mines from the path of a battle-fleet, and others have been taken up for this purpose since that date. The result of the tests carried out in the sweeping of mines by these trawlers has not been divulged, but it has been stated that during similar trials in Germany more than 80 per cent. of mines strewn were picked up by mine-seeking craft.

New plant.

Having dealt with the new developments in ordnance and armour, something may be added concerning the extension of, or installation of new plant in, the works of manufacturers devoted to their production. The recently increased demand for heavy guns and gun-mountings and in a less degree for armour-plate, has been met in two ways: first, by the enlargement of existing manufactories and works, and, secondly, by the establishment of new concerns like the Coventry Ordnance Works, Ltd. In the case of the former process British manufacturers have had serious difficulties to encounter. In some cases the necessary alterations to existing plant, and the limited ground space available for extensions, have involved a very wholesale rearrangement. Nevertheless, the private establishments have, almost without exception, faced these difficulties, and they are now quite prepared to carry into execution any orders likely to be made from them by the British Admiralty, independent of undertaking foreign work at the same time.

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Elswick. At Elswick Messrs. Armstrong, Whitworth & Co. have recently completed a new series of shops equipped with the very latest machinery, while at Walker, four miles below Newcastle, they secured last year a valuable site for facilitating the completion of ships during the later stages of their construction. The area acquired is considerable, and has a frontage of about 3000 feet. It is conveniently situated close to the present merchant shipbuilding yard of the company at Walker, where some 700 merchant and other vessels have been turned out, and is capable of considerable development should occasion require it. The new works will afford a convenient place for the mooring of vessels whilst steam and other trials are in progress.

Beardmore. Messrs. Beardmore & Co. have not added to their plant since the last issue of the *Naval Annual* was published, but the extensions and alterations of former years have borne fruit in the increased output of ordnance, especially heavy guns, from their Parkhead works. The firm have now, however, decided to install plant for the manufacture of mountings of naval guns of the largest type at Dalmuir, in order to bring their resources into line with those of the Vickers and Armstrong concerns, which can turn out guns complete with their mountings. As mentioned elsewhere, gun-making is a new industry at Messrs. Beardmore's works, but it is now in full swing, including the new 13·5 in.; and to this the manufacture of gun-mountings will now soon be added.

Firth. Messrs. Thomas Firth & Sons, Ltd., are another firm which have within the last fifteen months completely reorganised their works. In Sheffield, the purchase of twenty-two acres of land at Tinsley, where an entirely new and up-to-date electrically-driven rolling mill has been erected, has enabled them to dispense with their old crucible shops and rolling mills formerly situated at their Norfolk works. As a result they have trebled the space available for foundry work, and incidentally have the whole of this department concentrated on one site. The gun works, hitherto greatly hampered for want of space, have in their turn been expanded and rearranged in such a way that under the new conditions the heavy forging presses and large machine shops for dealing with the heavier classes of work are close together. At the same time, the shell plant has been redistributed to deal with its work in the most rapid and economical manner. New shops have been erected and modern machinery installed, so that the firm are now in a position to meet quickly and cheaply the most stringent of modern demands. The heavy machine shops, the larger bay of which is 300 ft. long by 85 ft. wide, contain large modern machine tools, capable of dealing with the largest

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FIRTH & SONS' HEAVY MACHINE SHOP, NORFOLK WORKS, SHEFFIELD.

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FIRTH & SONS' SHELL SHOP, NORFOLK WORKS, SHEFFIELD.

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forgings and castings. An illustration of Messrs. Firth's new large machine shop for machining gun-forgings and war-vessel shafting is shown on page 317. The shop contains lathes up to 12 ft. face-plate and 20 ft. long, 5 ft. 4 in. face-plate and 88 ft. long, and other lathes from 22 in. centres to 4 ft. 6 in. centres, and taking lengths from 25 ft. to 80 ft. There are also boring machines with beds up to 170 ft. in length, capable of dealing with the largest forged shafts. The largest slotting machine has a stroke of 10 ft., and there are the usual complement of drilling, planing, and other machines, with an output of a wide and varied character. Practically all these machines are electrically driven.

The shell shop, of which an illustration is given on page 318, contains thewhole of the machinery for the manufacture of projectiles of all types and calibres, and is so arranged that the work passes gradually from one end to the other as it approaches completion. Exclusive of auxiliary annexes, which contain grinding machinery, tool room, and tool stores, this shop measures 240 ft. by 90 ft., divided into two main bays of 50 ft. and 40 ft. respectively, one containing all the roughing and the other all the finishing machinery. With the growth of scientific knowledge, the heat treatment of steel is playing a more important part in manufacture. Whereas five years ago a great many forgings were never subjected to further treatment beyond that necessary for the forging operations, methodical annealing processes have now become an integral part of the manufacture both of forgings and steel castings.

Coventry.

During 1909 the progress made in the development of the Coventry Ordnance Works was considerable. The following are the principal shops:—Heavy machine shop, 556 ft. by 142 ft.; light machine shop, 265 ft. by 200 ft.; and large machine shop, large erecting shop, and large gun bay, covering altogether 929 ft. by 200 ft. The heavy-gun section is now busy with the manufacture of 12-in. naval guns, both to the design of the Government and also to that of the company. The latter follows the British practice of wire construction, but it is so designed as to be stiffer than previous models, thus doing away with the disadvantage of droop. In the gun-mounting section, the largest nature of barbette mountings to the firm's design are being made, in which many special features have been introduced to obtain improved accuracy and rapidity of fire. The final erection of these turrets is completed at Scotstoun, where the equipment includes a wet dock, from whence they can be transported by water with very little dismantling direct to the shipyards for erection on board. A large output of the heaviest guns per year is now possible, while as regards gun-mountings, an output

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for two and a half battleships per year could be maintained after thirteen months from the receipt of order. As a result of the Admiralty having assumed control of and responsibility for all natures of naval ordnance, arrangements have been made with the various contractors for the proof and inspection of guns to be carried out at their works, and to meet this demand the Coventry firm have constructed a range for testing guns up to 6 in. on somewhat novel lines. The gun platform is partially sunk in the ground and the range itself is through a tunnel, also partially underground, and covered with an earth bank, the butt, consisting of an armoured cave filled with sand, being situated at the opposite end of the tunnel. An electrical fan is provided for clearing the tunnel from fumes, and velocity screens are fitted which can be varied in distance apart to suit varying velocities. The advantages of this mode of construction are that the tunnel acts as a silencer when the guns are fired, thus avoiding annoyance to residents in a thickly populated district, and by a few electric lamps at the gun platform and near the target experiments can be carried out with convenience both by day and night.

Naval Aerial Department.

Reference is made in the Memorandum of the First Lord issued with the Estimates for 1910–11 to the important experiments which have been carried out by the recently formed Aeronautical Branch, and to the fact that officers, petty officers, and men are now being trained in aeronautics under the direction of a captain R.N. The design of an experimental airship has been completed, and it is expected that this vessel, which is being built by Messrs. Vickers, Sons & Maxim, will be ready for trials this summer. Precise details about the vessel are unobtainable, as the strictest secrecy had naturally been maintained concerning the initial developments of this new branch of the Navy's work. In outlining the progress which had already been made, Mr. Haldane, in the House of Commons on August 3rd, 1909, stated that "for naval purposes the rigid dirigible was probably the only instrument of the kind that was of real value, at any rate in the present state of knowledge. It might be quite different in twenty or even ten years' time . . . . To the Navy had been assigned the duty of investigating and attempting to construct a rigid dirigible of the Zeppelin type . . . . The number of men the naval balloon would carry was about 20."

Attack by balloons.

The exhibition last year at Frankfort succeeded in bringing more prominently than ever before the general public the new engine of attack that has apparently come to stay, both in naval and military operations of the future.

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Sir Trevor Dawson said in the course of his lecture before the Junior Institute of Engineers in June last year:—

The Zeppelin airship, by its recent voyage, offers striking testimony to the practicability of aerial navigation. This voyage was 584 miles long from starting point to arrival station, and the time taken gives an average speed of 23 miles per hour. This distance represents a radius of action from London as far south as Gibraltar, or as far east as the Russian frontier, or as far north as Norway. The French airship, too, has made a voyage of 150 miles at 21 miles per hour, the British War Office airship a trip of 40 miles, and the Wright aeroplane a trip of 77 miles at 33 miles per hour.

Colonel F. G. Stone, R.A. (Member of the Aeronautical Society of Great Britain), has dealt with this subject in the *Journal of the Royal Artillery*, December, 1909, and in his article he summarises the chief particulars of all the different systems of dirigibles extant.

There seems no longer, therefore, any room for doubt that in the most recent construction of airship we have an invention at once reliable, capable of a large range of action, and of very great speed even in practically all kinds of weather.

An idea of the large carrying power and speed of a dirigible airship may be realised when it is stated that the Zeppelin II. is 447 ft. long, 42½ ft. in diameter, and has a speed of 35 miles per hour. It is driven by two sets of powerful motors with a combined horse-power of 225, and this last figure is increased to over 300 in the latest pattern of Zeppelin. One such airship is capable of carrying 5500 lb. in addition to a crew of eight men. This would allow for a considerable quantity of explosives, etc., to be carried in the case of war. Proposals have been freely discussed by at least one great European Power for having a fleet of airships so disposed as to be able to patrol the whole of its frontier, which in time of war would form a very great instrument, not only of defence, but of attack.

Also, from the *Revue d'Artillerie*, December, 1909, we learn that dirigible balloons and their military application have received serious consideration, as set forth in the Report of M. Clémentel, "Extrait du Rapport fait au nom de la Commission du budget chargé d'examiner le projet de loi portant fixation du budget général de l'exercise 1910 (Ministère de la guerre)." The following is a digest of the functions of an airship as considered in the above report:—

1. At the commencement of the mobilisation a dirigible balloon at a place near the frontier would be at the disposal of the Commander-in-Chief to make reconnaissances on the points of concentration of the enemy, etc.
2. In a land war the dirigible would be attached to an army to guide it and mark off its movements three or four stages ahead.
3. In a siege, the dirigible would enable reconnaissances to be made of the investing forces in a manner very much superior to those obtainable by using a captive balloon.
4. The dirigible can furnish communication between a besieged place and the interior of the country. A demonstration of this has been made at Verdun by day and also by night.

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5. The utilisation of a dirigible in an offensive action for the projection of charges and explosives at certain points occupied by the enemy. However, it seems premature to conclude definitely that a dirigible can be used as an instrument of combat.

6. Lastly, in the different results which we have assigned to it, the dirigible would possess a considerable moral effect; the army which was not assured of the mastery of the air would live in a state of demoralised unrest.

Concerning the problem of attack by balloons, inventors have been very busy lately in designing instruments to ensure just as great accuracy in dropping explosives from a dirigible to the point of impact aimed at as is obtained with sighting gears in the ordinary way on our warships, but owing to the great altitude to which airships can rise time alone will be able to prove whether or not, with such altitude and very great speed of manœuvring at such an altitude, they would be efficient as instruments of attack. The Frankfort Exhibition, already referred to, furnishes ample evidence that gunmakers are actively engaged in designing anti-airship guns to, as far as possible, repel the attack of these aerial monsters. Many new problems have been introduced into the considerations of ordnance makers on this account, particularly in two chief instances, viz., the complete reconstruction of range tables on account of the greater altitude of the projectile during its trajectory, and the difficulty of designing suitable sights to ensure accurate laying of the gun. This latter difficulty is better understood, perhaps, when it is explained that ordinarily sighting gear is designed for guns which are to be used in what is, for all practical purposes, a horizontal plane, whereas, in the case of anti-airship guns, not only is the range undergoing continual alteration, but the altitude of the airship is also subjected to the same rapid change. All these problems are being seriously undertaken not only by the chief gunmakers of Continental nations, but also by those of our own country. Notably among the latter are Messrs. Vickers, Sons & Maxim, whose latest development in mounting a 3-pr. gun for high angle firing is illustrated on p. 323.

Anti-balloon guns.

With reference to resisting attack by balloons, two of the Continental ordnance manufacturers exhibited largely at the Frankfort Exhibition. So far the weapons designed for resisting attack by balloons have not been of very large calibre, and it has apparently been found that sufficient range can be obtained with guns up to and including 4 in. Colonel F. G. Stone, R.A., in his paper (already referred to) informs us that experiments were carried out in Germany to determine the best kind of ammunition for use against airships. The result of these experiments was a definite pronouncement that infantry fire was practically of no use whatever, as the holes made in the balloon were so small that the escape of gas occasioned thereby was not of any serious consequence, and designers

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VICKERS' 3-POUNDER ANTI-BALLOON GUN (HIGH ANGLE MOUNTING).

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at present seem to be centering their ideas round some form of incendiary shell which will ignite the gases in the balloon

Another alternative would appear to be shell with highly sensitive fuses. At any rate, it seems so far conclusive that shrapnel fire against airships is likely to prove ineffective.

Gun designers are at present vigorously engaged on three classes of gun carriage for anti-balloon guns, viz., those for use on field carriages, those for use from motor vehicles, and naval guns. Several examples of all these guns were exhibited by Messrs. Krupp and Ehrhardt at the Frankfort Exhibition, and it is satisfactory to know that the question of guns for balloon attack is being seriously undertaken by British ordnance manufacturers, notably by Messrs. Vickers, Sons & Maxim, Ltd., who have studied the production of this class of ordnance up to and including those of 6-in. calibre. It would seem to be evident, from the very great angle of elevation at which these guns have to be run up after firing, that the question of the devices for resisting the recoil and ensuring correct counter-recoil, will be completely revolutionised before a perfectly satisfactory arrangement has been devised.

United States.

Heavy guns.

The Bethlehem Steel Company of South Bethlehem, Pa., has obtained the contract for the armour, guns, and gun-mountings of the Argentine battleships which are to be built at Quincy, Mass., by the Fore River Company and Camden, N.J., by the New York Shipbuilding Company, as well as for the guns of the destroyers building in Europe. The battleships are to be armed with 12-in. guns of 45 calibres, presumably of the model of those carried by the Florida and Utah.

The later United States battleships Arkansas and Wyoming will be armed with guns of a new 12-in. 50-calibre type, which gives to its 850-lb. projectile an initial velocity of 3030 ft.-secs., and a muzzle energy of 52,500 ft.-tons. In a test of firing five rounds with the latter gun at 17,000 yards range the dispersion was less than 100 yards. Admiral Mason, Chief of the Bureau of Ordnance, describes the gun as "much more powerful than any guns now afloat." It certainly marks a great advance on the guns of the Florida and Utah, which themselves give greater muzzle-velocity than earlier like guns in the American Service. The gun, which it is proposed to mount in future United States battleships, is of 14-in. calibre, with a length of 45 calibres. It will fire a 1400-lb. projectile with a velocity of 2600 ft.-secs., representing a muzzle energy of 65,600 ft.-tons. This new gun is reported, like the 50-calibre

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12-in., to have been tested on the proving grounds with marked success, and it is understood that the Naval Secretary has foreshadowed to the Naval Committee of the House of Representatives the arming of the battleships which it is expected to lay down next year with ten of these guns.

Gun mountings.

Mountings have been designed for both calibres of guns. Those for the 12-in. generally resemble the mountings constructed for the Florida and Utah, but the trunnions are placed nearer the front armour-plate, with the object of enabling the gun opening to be reduced in size, and Admiral Mason says that a new feature is embodied, whereby it is easy "to place the pair of guns in a turret parallel to each other, and to correct variations from parallelism which occur after installation owing to deformation of the structure due to firing stresses." The various problems which arise from the system of using a long ammunition trunk reaching from the turntable to the shell-room, and of a broken or two-stage system, in which ammunition is brought up to a position below the gun, and there transferred to the gun hoists, have been exhaustively investigated in the United States Navy. The new ships are fitted with the two-stage system, the hoists being operated by electricity, and controlled by automatic apparatus, and supplemented by independent auxiliary hoists. As to the mounting designed for the new 14-in. gun nothing seems to be known. Obviously the rate at which a gun can be fired depends on the time required severally for the different operations at the gun and in connection with the hoist, and the former have now been reduced to the lowest possible limits. Great rapidity in handling has been attained in the British Service, and even ten years ago it was estimated that when a gun had been fired, nine seconds were required to run out and open the breech, five seconds to wash out, three seconds probably in waiting for the cage, twelve to ram the shot home, and twelve to ram the powder home, three to clear away the cage, four to close the breech, and three to fire the gun (already laid), so that the minimum time was fifty-one seconds for the whole operation. The rapidity was in practice likely to be ruled by the time required to load the cage and unload it at the gun, and to raise the cage from its loading position and lower it again, and these times were estimated to be sixty-four seconds with the direct trunk system, and only forty seconds with the system of a break in supply. The advantage was in having the loading position of the hoist only three seconds from the gun, as compared with twenty seconds when the hoists came direct from the magazine. Advances have since been made in all-round loading and loading at any angle of elevation, and such are the mechanical improvements

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that a rate of fire is now possible of three or four rounds per minute with 850-lb. projectiles.

It has been recognised in the United States Navy that the danger of the direct hoist system was great, as had been proved by disaster, and now the turrets of the older ships which have the single stage system are being overhauled. The Idaho and Iowa have been fitted with a trunked-in type of ammunition hoist, and the 13-in. turrets of the Oregon are to be equipped with this type. The elevating gear of all turret guns worked by electricity is to be remodelled, and a contract was entered into for one-half of the work, but the apparatus is of special design, and the manufacture is in few hands having small plants. An experimental pneumatic ammunition hoist of novel design was successfully tried with one of the 8-in. turrets of the Massachusetts, and a larger type is intended to be tested.

Smaller guns.

Turning now to the smaller calibre of the United States ordnance, we find the 6-in. probably that which will be finally adopted, though many still favour the 5-in. By special arrangements the horizontal arcs of training of these guns mounted behind vertical armour (in a straight run and not at a corner or angle) has been made 150 degrees, which means that the gun can be laid, by means of its telescopic sights, anywhere within this arc, and that the gun's crew and all the usual parts of the gun are protected throughout the whole of this large arc of training.

The very great activity in the matter of the quick handling of the guns and getting the ammunition up quickly so as to ensure rapid service has naturally been attentively considered in the United States Navy. Some turret guns have been fitted to load at any angle of elevation, and, notwithstanding that this gives rise to a good many complications, not the least of which is the necessity of locking the ammunition cage to the gun during the process of unloading it into the gun, it meets with much favour. On the other hand there appear to be many in America who believe that the machinery of the turrets is already so complicated as to justify its abandonment in large measure, and a resort to hand loading. Even the machinery for elevating guns in turrets by hand alone is thought to offer no inconsiderable attraction. Thus in recent sub-calibre practice with a 7-in. 45-calibre gun, on the proving grounds of the Bethlehem Steel Company, the following number of hits per minute were realised with a two-handed elevating gear at the angles of roll given :—

Degrees.	Hits per Minute.
1	20·5
2	17·0
3	16·0
4	9·0
5	7·0
6	5·5

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This does not mean, of course, that with a gun rolling continuously through an arc of 6 degrees, a man would be strong enough to follow the target and hit it 5½ times per minute, but only that in a mixed system of rolls, in which the arc of 6 degrees is frequently reached, the man has sufficient wind and power to follow it to this limit and fire successfully at the end of rolls of 6 degrees. Men firing at targets properly controlled as to speed and amplitude will usually try to fire at the ends of rolls, where the target's apparent velocity is small or zero. It may be added to the above that the arcs of roll just given are measured as is usual at sea. They represent half of the total arc rolled through, or are the arc on one side only.

New sight.

The Bethlehem Company is bringing out a new sight which is, in a way, a return to first principles. When heavy guns began to be mounted amidships on pivoted slides some forty or fifty years ago, what was called trunnion sights were much used. These trunnion sights consisted of a brass disc graduated in degrees of the same size as the end of the gun's trunnion and fastened to it. In the centre of this brass disc was pivoted a wooden or metal bar some two or three feet long, with a front sight at one end and an ordinary notch for the rear sight at the other. The new sight introduced by the Bethlehem Company is of the same character as the old trunnion sights, the telescope being pivoted at the centre of a scale carried on the gun's trunnion, with the exception that the telescope is so attached by an eccentric to the scale that the scale is distorted in such a way as to make its first part larger than the natural size and its final parts smaller than the natural size, in order that all parts may be readable to the gun-layer. The circle carrying the scale is 12⅜ inches in diameter, but it could just as easily be made larger, which would result in moving all the marks further apart than they are on the present scale. To indicate a little more clearly the advantage claimed for this arrangement it may be pointed out, for example, that in changing the range from 2000 to 2100 yards, the actual elevation of the gun would be changed by 3·5 minutes of arc, but the actual size of the distorted arc carrying the scale would be 49·9 minutes. The circular scale is thus magnified from its natural size nearly fifteen times. It should be observed that this distortion varies from point to point and that the distortion can be made a maximum at any point of the range scale desired. Not the least of the advantages of this form of sight is the absolute fixity of the scale to the telescope, there being no lost motion between the telescope and the scale by which it is set.

Safety lock.

Another feature of interest brought out recently by the Bethlehem Steel Company, which has been experimented with to a very

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considerable extent, is a new form of lock, whereby the gun is primed during the last part of the screwing up of the breech block, or even after the breech block is screwed to its seat and has stopped there. An illustration on page 329 indicates the character of this lock. The right-hand view shows the primer in the carrier with its axis out of line with the vent, so that it may be fired by any accident without lighting the charge of powder in the gun. The left-hand view shows the primer in its seat in the vent, and the primer carrier below. The extraction of this lock is very forcible. The purpose has been to avoid the danger of priming guns before the breech blocks are closed, which has led in some navies to a prohibition to put the primers in until the blocks are fully screwed up. The result of the use of the lock is to accelerate the rate of firing, while not introducing any danger. In breech blocks moved by hand levers, they are $\frac{43}{50}$ths screwed up before the primer is in line with the vent, and in breech blocks screwed up by the turning of a crank the breech blocks come to rest entirely before the primer begins to move into line with the vent.

Propellants.

In regard to the United States service powder, the following extract from the Annual Report of the Chief of the Bureau of Ordnance is of interest:—

> The general composition of our powder has not been changed, although various improvements have been made at both the Government and private factories tending to produce a better and more uniform powder. The ballistics and stability of the powder are good, and certain suspicions of variation in ballistics which were formerly directed against the powder have been shown to be unfounded, such variations proving to be due to other causes. Successful experiments in the refrigeration of magazines have been conducted, and our newest ships will be fitted with complete cooling arrangements. The magazines of older ships will be similarly fitted as opportunity offers. A simple and efficient method has been developed for testing the stability of smokeless powder on shipboard, and testing outfits will be issued to the service as fast as they can be manufactured. The investigation of the bearing of smokeless powder upon the erosion of guns has been continued, and it is hoped that results may be obtained which will make it possible to increase considerably the life of our guns. Newly reworked and better quality of powder for ignition purposes has been issued to the Service. . . . Experiments are now in progress with a new form of smokeless powder—up to the present time with fair results. While our present smokeless powder is very satisfactory, it is considered wise to continue such experiments, as there is always a possibility of finding a powder even more satisfactory than the one that we now have.

Armour-plates.

Turning now to the subject of armour, we find that information is scanty from the United States, as from other nations. The establishments chiefly engaged in the work are the Bethlehem Steel Company, the Carnegie Steel Company, and the Midvale Steel Company, and the average prices paid are $420 for Class A armour, $405 for Class B, $458 for Class C, and $509 for Class D. On page 331 is illustrated a Bethlehem acceptance test-plate, tried in December, 1909, whose thickness varied from 11 in. to 9 in. The

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NEW LOCK AND SAFETY PRIMER.

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penetrations were small, as will be seen from the photograph and from the following table. The plate was curved on a 169¾-in. radius, and had a 6-in. oak backing. The projectiles were 10-in. capped A.P., weighing 510 lb., and the thickness at the points of impact was 10 in. No cracks developed in the plate, and in each case the shell was wrecked. While the plate was not tested to anything like the point of destruction, the small penetration and the freedom from flaking round the impacts were considered very good.

Round.	Results.		De Marre.		Penetration.	Effect on Plate.		
	Striking Velocity.	Energy, ft. tons.	Velocity.	Co-eff.		Dish.	Diam. Spall.	Diam. Impact.
					in.	in.		in.
1	1566	8681·5	1275·4	*1228	2½	¼	None	9 × 10
2	1566	8681·5	„	*1228	4⅛	¼	„	9 × 10
3	1557	8581·3	„	*1221	4	½	„	9 × 10

NOTE.—Velocities and co-efficients marked * can only be compared with other capped projectiles. Round 2. The point of shell left sharp impression in plate.

An illustration is also given (page 331) of a Bethlehem plate made for the testing of projectiles early in 1909. It was 14 ft. by 7 ft. 6 in. by 6 in. thick, and had been attacked thirty-one times by projectiles, as the illustration shows, and perforated twenty-nine times. The projectiles all weighed 105 lb., and were capped, and the striking velocity in all cases was in the neighbourhood of 2100 or 2200 ft.-secs. The notable point about the plate is the extreme number of projectiles which it has received. It may be noted that to the right and below the vertical wooden brace, the wall between two impacts was not more than one-half calibre thick, and yet there was no appearance of cracking.

Deck plates.

With regard to deck protection, some remarkable results have been attained at the Indian Head proving ground with "Special Treatment" plates, which have been adopted for the Navy, it being maintained that the increased power of the 3-in., 4-in., and 6-in. guns has rendered old nickel-steel protective deck-plates comparatively valueless. This is obviously a matter of as great importance to the British Navy as to any other. The advance has been made by the Harvey Steel Company, and it is reported that the naval attachés in the United States were very greatly interested in the trials, and that certain European Governments have requested trial plates to be submitted for their own tests. The approximate physical characteristics

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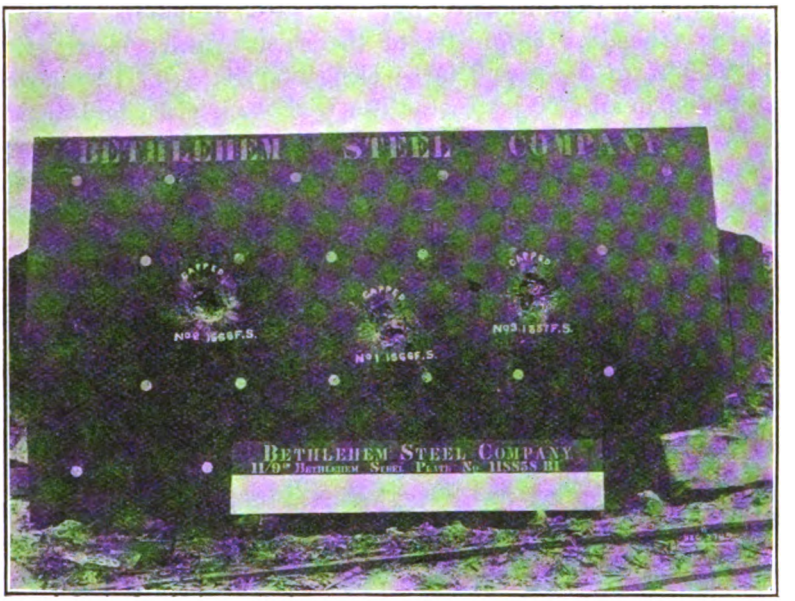
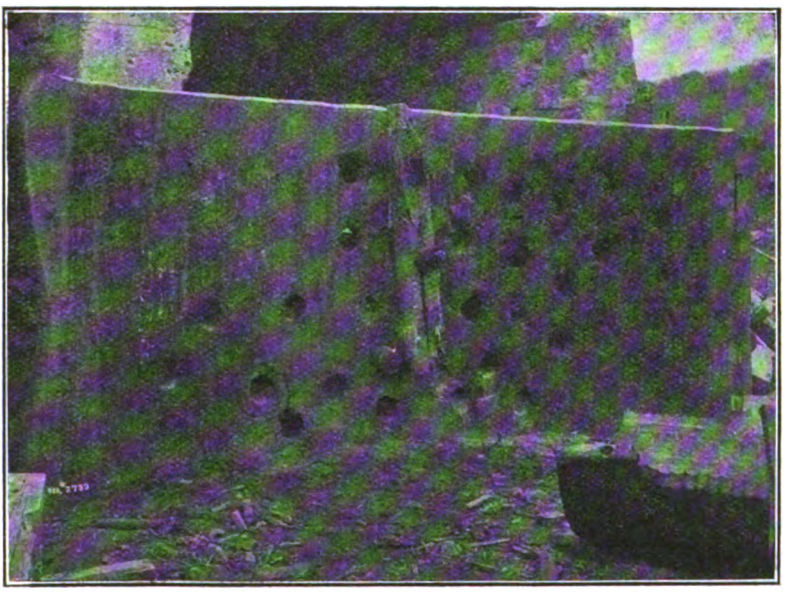


Bethlehem acceptance test-plate after attack by 10-in. capped A.P. projectiles.



Bethlehem 6-in. plate after attack by 31 capped A.P. projectiles.

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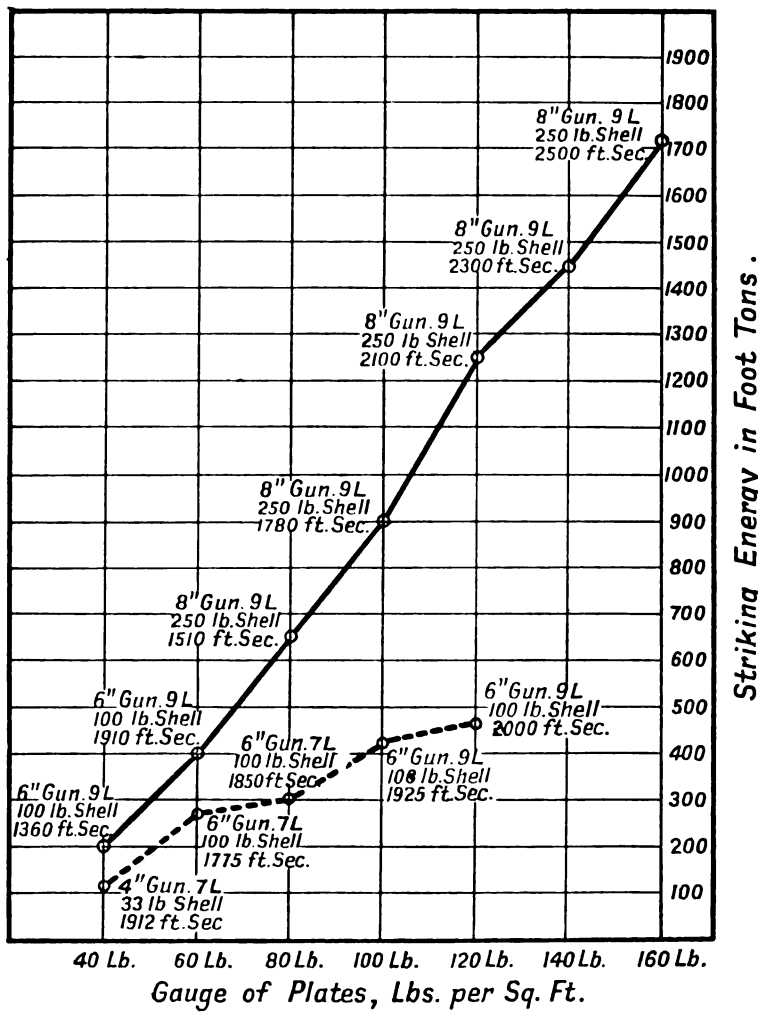
of the special treatment steel have been given as follows:—Ultimate tensile strength, 130,000 lb. to the square inch; elastic limit, 118,000 lb. to the square inch; elongation in 2 in., 19 per cent.; reduction in area, 50 per cent. The trials took place in December, 1907, the comparison being with an ordinary standard plate tried in the previous February. In all these trials the impact was normal, the gun was a 3-in. firing a 13-lb. projectile, and the plate was 2 in. thick. The following is a table of results:—

STANDARD PROTECTIVE DECK PLATE.

	Round 1.	Round 2.	Round 3.
Striking Velocity . .	1015 ft.-secs.	1065 ft.-secs.	1165 ft.-secs.
Penetration	Complete	Complete	Complete



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STANDARD "SPECIAL TREATMENT" PROTECTIVE DECK PLATE.

	Round 1.	Round 2.	Round 3.
Striking Velocity . .	1632 ft.-secs.	1889 ft.-secs.	2074 ft.-secs.
Penetration	$\frac{1}{16}$ in.	$\frac{5}{16}$ in.	$\frac{3}{4}$ in.

The following are tables of Ballistic Test Specifications for Standard Nickel Steel and "Special Treatment" Steel Protective Deck Plating :—

Gauge of Plate. Standard Nickel.	Calibre of Gun.	Striking Velocity. Foot Seconds.	Striking Energy. Foot Tons.	Angle of Impact.
inch.	inch.			degree.
1	4	1912	110	7
$1\frac{1}{2}$	6	1775	275	7
2	6	1850	300	7
$2\frac{1}{2}$	6	1925	415	9
3	6	2000	450	9

Gauge of Plate. "Special Treatment."	Calibre of Gun.	Striking Velocity. Foot Seconds.	Striking Energy. Foot Tons.	Angle of Impact.
inch.	inch.			degree.
1	6	1360	202	9
$1\frac{1}{2}$	6	1910	398	9
2	8	1510	647	9
$2\frac{1}{2}$	8	1780	900	9
3	8	2100	1250	9

FRANCE.

Iéna trials.

Not since the firing at the Belleisle have any like trials taken place so important as those in which the Iéna was made the target in an elaborate series of experiments conducted last year by the gunnery experts of the French Navy. The many disasters which have occurred through the premature detonation of French explosives, primarily in the case of the Iéna herself, but also in a series of gunnery mishaps, made it desirable or necessary to satisfy naval opinion on the subject, while, at the same time, there were many questions with regard to the protection of ships which it was desirable to throw light upon. The Iéna trials had thus a double purpose, and, though no official report on them has been allowed to be made public,

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enough is known to enable it to be said that the results were highly satisfactory. The programme, which was drawn up by a committee in February, 1909, and approved by the former Minister of Marine, though reduced as the result of later discussions, ultimately provided for a most exhaustive series of tests, which have further significance in relation to firing trials at the Duperré, Tempête and one or two other vessels.

Large-capacity shells.

Ever since the war in the Far East there has existed in the French Navy a class of thinkers who have been described as the "Semenoff school," because they have attached the utmost importance to large-capacity high-explosive shell. Those among them who desire to see a "portmanteau" shell introduced, carrying explosive to the extent of 15 or 20 per cent. of its own weight, have not altogether been content with the Iéna trials. They do not regard the *obus alourdi* as falling within the category of the shells they advocate, nor a new shell which contains 10 per cent. of mélinite. General Gossot, until recently Director of Ordnance, expressed the opinion that this proportion should be sufficient, but the shell appears to be intended only for the 6·4-in. gun. It is, however, known that a shell, called the P, is in existence for the 9·4-in. gun which it is said has a charge of about 17 per cent. of cresylite or other explosive, and is fired with comparatively low velocity. During the trials the latter shell was fired by the coast guns. It must be observed, however, that the precise proportion of explosive carried by a shell compared with its own weight does not necessarily represent its explosive effect, which depends rather upon the weight of explosive that is effectively employed, and it is a fact that the 12-in. shells for the ships of the Danton class, while having no more than 3 per cent. of explosive, are of the *alourdi* type, weighing 440 kilos, as compared with the 340 kilos of their predecessors, and carry 13·2 kilos, instead of 8 kilos, of mélinite.

With these preliminaries we may turn to the actual circumstances of the Iéna trials. It was originally proposed that the trials should include long-range practice, and that a sum of £24,000 should be voted, but at the suggestion of Admiral Bienaimé the scheme was restricted and the amount somewhat reduced, it being held that short range firing, with charges reduced in proportion, would be equally valuable for the scientific purpose in view. In the end, however, the naval authorities did verify their first experiments by some firing at long range. The trials began on August 9th, the Iéna being moored in the harbour of the Salins d'Hyères, and the ship firing was at a distance of from 500 to 600 mètres, or, according to another statement, at only 300 mètres, so that the range may have been anywhere

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between 330 and 660 yards. Be this as it may, the experts at Gâvres had so regulated the amount of propellant that the firing had the same effect as if it had been at a range of 6500 yards. The object of the short range was, of course, to make it practically certain that the projectiles should strike the part of the ship that was desired.

The Iéna had been very carefully fitted for the trials. Her guns had been removed, but others of an older type had been mounted in their places, and she had received some electric, pneumatic and steam fittings such as are required in the most modern battleships, while some of her compartments had been filled with cork to reduce the risk of foundering. It was particularly desired to study the effect of the new explosives on living beings, and to such an extent were the preparations carried that over the hearts of some of the dogs, rabbits or pigeons placed in the casemates microphones were attached, so connected that persons on board the ship firing might be able to hear the beating of these hearts. Here it may be said at once that these refinements were found useless, and were soon abandoned, the animals being mostly found alive and undismayed by their experiences. The medical officers who were attached to the committee found that in the case of some which died, death was caused by actual injury and not at all by poisoning. There was thus some evidence that the idea of "carbonic acid gas bombardment" was an idea only, and the moving account given by Semenoff in his "Agony of a Battleship" is still seeking further support.

Details of trials.

The firing opened in the presence of Admiral Boué de Lapeyrère, and the procedure was slow throughout owing to the exactitude with which everything was carried out. No gun was fired until it was laid with absolute certainty on the mark. The Condé was the first ship to fire, and when all was ready for each round the turret in which the gun was situated was closed, and the firing was by electric circuit from a distant turret, while all officers and men were in shelter. It had been said that the shells employed were more dangerous to those who used them than to those at whom they were discharged, and no precaution seems to have been omitted. There had been premature detonation, not only in exercises, but in actual firing on the coast of Morocco, and a thorough test of the shells in stock was considered necessary both in the Iéna firing and in tests of selected lots ashore. It is said that in the case of the Iéna every type of projectile was used, including the old cast steel shell, of which there are still large stocks, the semi-perforating shell, the shell of large capacity, and the redoubtable new P shell. The Condé began by firing three shells, of which only two hit the ship, and they

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are said to have caused the beginning of fires on board. After each round the committee visited the ship, examined the damage done, and took many photographs, and thus about an hour elapsed after every shot. After a few days the Latouche-Tréville relieved the Condé and the series of trials with 6·4-in. and 7·6-in. shells were concluded.

Great secrecy attended the trials, but it was known that at first perforating and semi-perforating shells were used, because the aspect of the ship attacked was little changed beyond the appearance of shot holes, while the casemates and turrets were much damaged within. These projectiles were fired at the thinner plating and unprotected parts, and in one casemate a fire broke out, which is reported to have caused some cartridges kept there to be burnt. The perforation of the shells employed was, however, already known, and the damage caused no surprise, the only lesson being that it was necessary to eliminate at all cost the use of linoleum, heavy painting, and all combustible things, and to organise on the best footing the fire extinction service on board. Much more surprising was the immunity of the living creatures, which has been alluded to above. Steam pipes were broken, and electric and other communications cut off, from which some were inclined to conclude that centralised fire-control could not be depended upon, and that, when once the range has been given, the conduct of fire must be left to the officers in charge of guns.

Further trials.

After the firing of the Condé and Latouche-Tréville, a 9·4-in. gun ashore opened fire, making use of P shells and long shells of the coast batteries, not directing them against the underwater parts, as in the former firing at the Duperré, but against the superstructures. This exercise is said to have shown that thin-walled large-capacity shells, not passing through armouring, do only local damage. On this point it would be unsafe to accept all that has been said without some reserve.

The Suffren afterwards fired her 12-in. guns, using the perforating and semi-perforating shells which are supplied to all French ships up to the Patrie class inclusive, as well as the *obus alourdi*, which is to be issued to the Dantons. The two first named gave the results that had been expected from them, and the semi-perforating shell did well from the point of view of perforation even at an angle of obliquity of 40 degrees. As to the *obus alourdi*, the trials were extremely favourable, the shell giving all the results expected from the original calculations, both in ballistic qualities and perforation followed by explosion. One French report says that these shells perforated cemented steel equal in thickness to their own calibre, and exploded on the other side, but on this matter it will be well to receive the information with some caution.

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With the various types of guns several kinds of fuses were employed. They are all based on the utilisation of centrifugal force, and become effective when the shell is at its maximum speed of revolution, determining the explosion when the revolution is suddenly arrested by the entry of the shell into the armour-plate. The adjustment of the fuses of this class is necessarily delicate, because they must not cause the shell to burst until perforation has occurred, and yet they must be effective against thin plating. Particular importance was attached to a new fuse of the class known as the W fuse. MM. Schneider have a fuse of this type, which is referred to below. Fuses.

The Iéna was a good deal damaged by all this firing, but the "scientific trials" were followed by long-range firing by the decision of the Minister and at the wish of the gunnery officers. The Minister was present when the Suffren, at a range of 6500 yards, fired five rounds from her 12-in. and three from her 6·4-in. guns, six of the rounds reaching their mark in the Iéna, and doing great damage. The firing was continued by the Suffren and the Jules Michelet with 6·4-in. and 7·6-in. guns; and at intervals during this firing the ship was completely examined. She had suffered very great damage, and it was surprising that she had kept afloat so long. On December 2nd, however, a strong wind sprang up from the west with a heavy sea, and she capsized and went down, like the Duperré and Tempête before her. She lies in the bay of Alicastre, and it is probable that the hull will be sold on the condition of its speedy removal. Long-range firing.

The principal points to be noticed, so far as they can be disengaged from descriptions in the French Service press, have already been alluded to. Generally speaking, the perforation of the shells was what the trial ground had shown it should be, and thinner plating proved no protection against the more powerful guns. Explosion of the shells took place after passing through the armour. As to the danger of fire, various reports have been given. One writer says that a fire in a casemate burnt for an hour and made the casemate walls red hot. That considerable damage was done within the ship there can be no doubt, and, though the results were not such as Semenoff's book would have led some to expect, there was such a breaking of communications as to make special arrangements necessary unless the like is to occur in war. No doubt many lessons have been learned which will not be without influence in the design of the new French battleships. The firing at the Terrible and Fulminant will also afford valuable lessons. The former was pounded with shell by the Pothuau in August from 8 to 11 a.m. one day, after which she went down Lessons of trials.

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some miles outside Cape Sépet. Fire was opened at 10,000 yards. All these trials have taken place under the direction of Admiral Le Bris and the gunnery officers, and they are to be congratulated on the exhaustive character given to them, and the gratifying results. It was more especially gratifying to them that no mishap occurred throughout the trials, and that in the long-range firing, in which the projectiles were taken without selection from the lots issued to the fleet, the shells proved perfectly safe in handling and use. The apprehensions which so many disasters had raised in the Navy were thus removed, and the present ammunition is now regarded as fully trustworthy.

Centrifugal fuse.

Reference has been made above to the centrifugal fuse of MM. Schneider. It is claimed for it that it is perfectly safe in use, and cannot cause premature detonation while it is sufficiently sensitive to operate on the impact of the shell fitted with it on thin plating. Yet the transmission appears to be such that the detonation cannot take place until the shell has actually traversed the plating. This fuse is claimed as of great delicacy in setting, and that it can be adjusted for various thicknesses of armour and the burst be determined with accuracy.

High-explosive shell.

The experiments of the Gâvres committee, which led to the introduction of a high-explosive shell, were of a very exhaustive character. MM. Schneider, of Le Creusot, who have for a very long time been experimenting with shells of this class, employing many forms of explosive, but particularly that known as Schneiderite—which is a mixture of an alkaline nitrate and a nitrated hydro-carbide—were asked to present for trial to the committee a capped 9·4-in. shell, which weighed about 355 lb. and contained some 17 lb. of Schneiderite. It was fired with the fuse in place, but without priming, and, at an angle of 15 degrees, with a striking velocity of 1510 ft., it completely perforated a 4·65-in. special steel plate, with double steel backing, giving a total thickness of 5½ in., and was found undamaged and without crack at the rear. The object was to show the insensibility of the explosive to shock. It remained to be seen whether its explosive power was complete and undiminished. Accordingly the fuse was primed, and, in a special pit, the shell was exploded electrically, being broken into a great number of fragments.

The possibility of mounting larger guns than the 12-in. in the battleships of the future has naturally attracted a good deal of enquiry in France, and the many problems that arise in relation to the proposal appear to have been considered attentively. No doubt the making of 13-in., 14-in., and even 15-in. guns of 50 calibres is a matter of mechanics and of the production of a satisfactory, slow-

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burning powder. But the consequences for the naval constructor are of another order, and it is precisely these that have retarded progress in this direction. Certain it is that the new French ships will be armed with the 12-in. It seems, however, to be anticipated that the improvement of gun-steel, as well as developments in propellants, will ultimately make the introduction of bigger guns possible without material increase of weight. Meanwhile, MM. Schneider are advocating guns of larger calibre for coast defences, and the following comparative table shows the advantages they claim for their guns, assumed to be approximately of the same weight.

Calibre of the gun . . . . . in.	12	13·5	14·5
Length in calibres	50	42	37
Weight of projectile . . . . . lb.	990	1,375	1,760
Weight of charge . . . . . lb.	383	383	383
Pressure (approximate) . . . . . tons	2,953	2,953	2,953
Initial velocity . . . . . ft.	2,822	2,543	2,379
Residual velocity at 9,842 yds. (=9,000 m.) . ft.	1,700	1,617	1,590
Residual velocity at 13,124 yds. (=12,000 m.) . ft.	1,440	1,388	1,388
Initial energy . . . . . tons	16,729	18,794	21,156
Energy at 9,000 m. . . . . tons	6,100	7,630	9,477
Energy at 12,000 m. . . . . tons	4,350	5,630	7,200

In this table will be observed the increase of power attained with guns of 13·5 in. and 14·5 in. as compared with the 12-in gun, this increase being respectively 13 and 26·5 per cent. in initial energy, 25 and 55 per cent. in energy at 9000 metres, and 29·5 and 65·5 per cent. in energy at 12,000 metres. There is, of course, also the possibility of increasing the weight of explosive contained in the larger projectile, without detriment to its greater perforating power. Precision of fire has likewise to be considered as affected by the lower velocity of heavier projectiles, but on the whole there is reason to believe that the accuracy would not greatly differ from that of the 12-in. MM. Schneider maintain that the bigger guns would themselves cost comparatively less than the 12-in., while their mountings would be more expensive. The projectiles would also cost more, but the guns would have greater endurance. Thus the Creusot co-efficient of usage or erosion is calculated to be 6·45 for the 12-in., 4·45 for the 13·5-in., and 3·45 for the 14·5-in. These calculations have been based on many trials, and lead to the inference that, at least for coast-defence purposes, guns of these larger calibres might be introduced.

Some particulars concerning the Schneider rammer for heavy guns, which is worked by means of an endless chain, and is applicable

Endless chain rammer.

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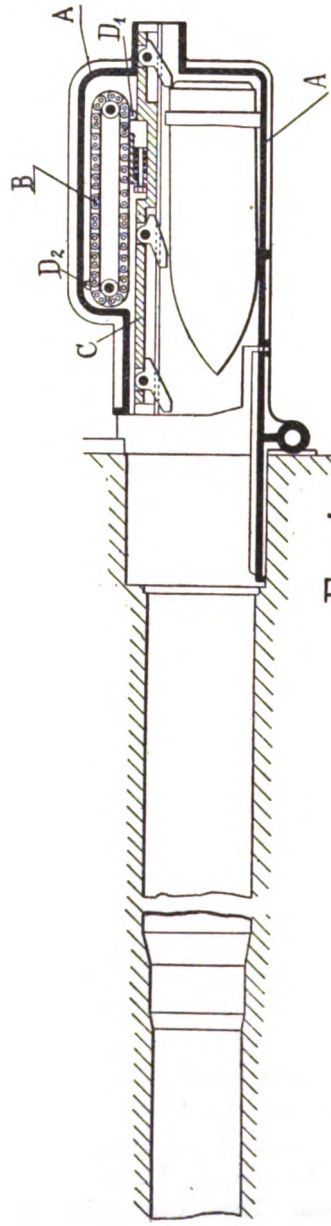

Fig. 1.

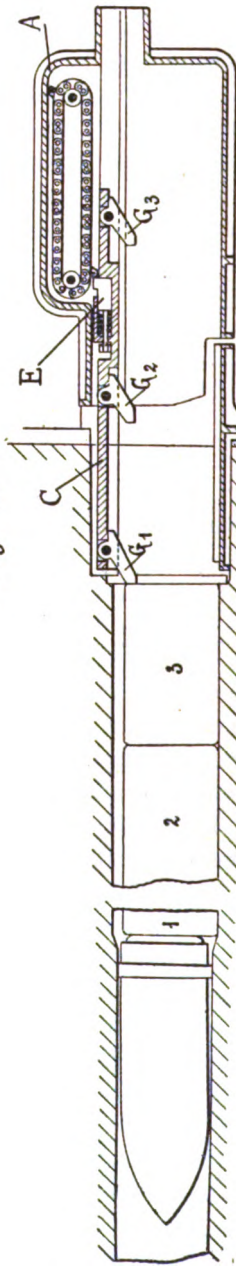

Fig. 2.

THE SCHNEIDER RAPID LOADER FOR HEAVY GUNS.

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to the loading of guns in any position of training or elevation, will be of interest. The diagrams on page 340 fully illustrate the working, but for greater clearness the hoist and chain motor, which are on either side of the loading position, are not represented. As will be seen, the rammer, C, is carried forward by means of two claws, D_1 and D_2, which operate an elastic buffer, E, and when one of these claws is released from the buffer, the rammer, upon which the articulated hooks or teeth, G_1, G_2, and G_3, will be noticed, is brought back to its first position by the action of a returning spring. In operation, when the breech is opened and the ammunition trunk is in position directly in line with the breech of the gun, the whole being rigidly fixed, the projectile arrives in the manner shown in Fig. 1. The endless chain is then set in movement, forcing forward the rammer, which again drives forward the projectile by means of the rear tooth, G_3, until the claw, D_1, escapes from the buffer, E, whereupon the rammer is returned to position by the spring. By this time a part of the powder charge has been rolled into the loading tray, and the endless chain, continuing its movement, brings the claw, D_2, and the elastic buffer into operation, whereby the cartridge is driven forward by the rammer. The same operations continue for the remaining portions of the powder charge, and the movements are repeated for successive loadings of the gun. The working of the system has been tried at all vertical angles of loading, and there has been no tendency of the charges to move towards the rear. It is claimed, therefore, for the Schneider endless-chain mechanism that it is both secure and rapid in operation.

GERMANY.

Types of guns.

Although problems concerning the armament of battleships have been the subject of a good deal of discussion in Germany, there is comparatively little to add to what was said in this section of the *Naval Annual* last year. The Nassau and her sisters carry the 11-in. gun, which is undoubtedly an excellent weapon, though the German claim that it is the equal of our 12-in.—certainly not of a late mark of that gun—cannot be sustained. Its endurance is remarkable, and a gun of the class kept for trial purposes on the proving ground at Meppen has fired a remarkable number of rounds, though recent information concerning it is not available. The Krupp "efficiency figure" for this gun, being the muzzle energy developed per unit of the weight of the gun, is given as 41·30 ft. lb., while the like figure for our 12-in. (Marks VIII. and IX.) is stated by German authorities to be 30·82 ft. lb. and 31·10 ft. lb. It is asserted that,

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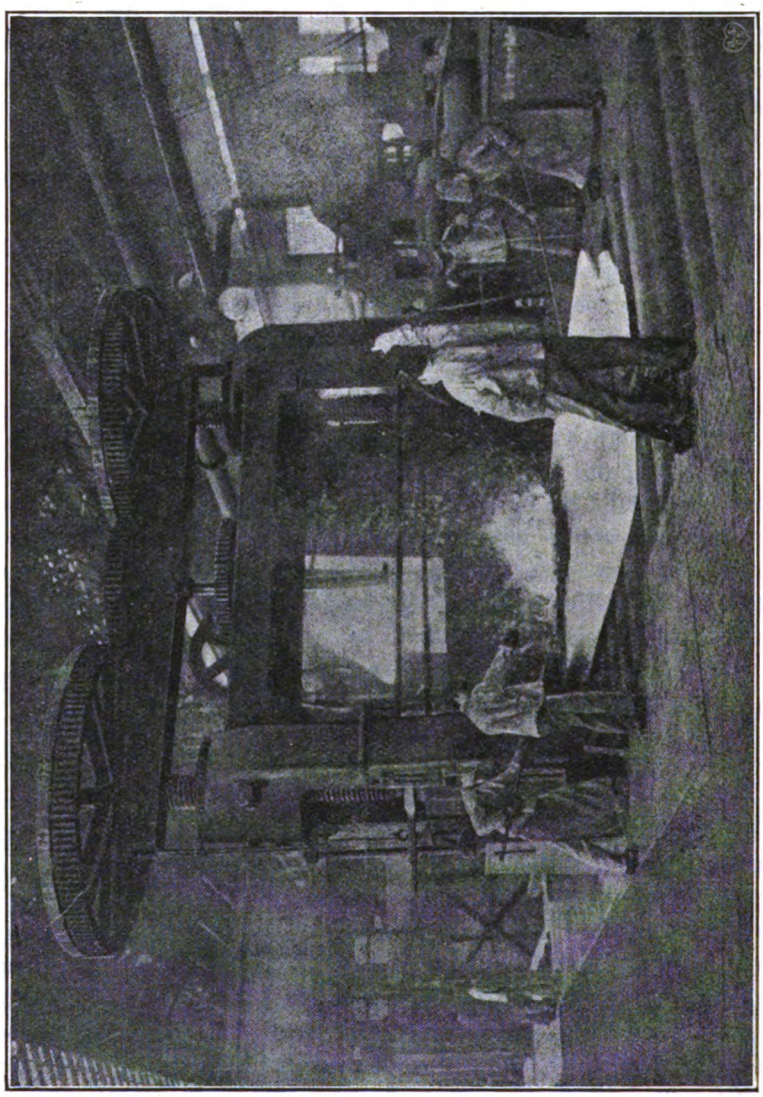
with an initial velocity of 2300 ft.-secs., the armour-piercing projectile of this gun will penetrate 22·5 in. of Krupp steel at 3000 yards, 19 in. at 5000 yards, and 8·5 in. at 10,000 yards.

KRUPP'S WORKS, ESSEN.



ROLLING AN ARMOUR-PLATE.

Further, it is reported that the gun can be fired at the rate of two rounds per minute.

The latest type of the Krupp 12-in. gun is 50 calibres, and its "efficiency figure" is given as 50·32 ft. lb. This is presumably the gun that is being mounted in the new ships, and it is a weapon of

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the customary Krupp jacket and hoop construction. A bigger gun, said to be of 13·5-in. calibre, is now being manufactured, but as to the likelihood of its being mounted in future battleships nothing seems to be known. Nor can it be said definitely whether it has yet passed beyond the experimental stage.

Essen works.

An account was given of the Krupp establishment last year. There has been some fluctuation in the number of officials and men employed at Essen and the trial grounds. Thus, on January 1st, 1907, they numbered 35,745; on January 1st, 1909, 33,917, and in November 1st, 1909, 36,288, being an addition of 2371 during the ten months of the latter year, but only of 543 as compared with January 1st, 1907. The capacity of the Krupp ordnance factories has been much discussed during the year. They have been credited with the ability to turn out the guns and gun-mountings for eight Dreadnoughts per annum. There is nothing really incredible in such statements, considering that the Essen works have had to provide the ordnance requirements of four big ships each year for the German Navy, with reserves of guns, and to be ready to do the same for any foreign warships that German shipbuilders might secure contracts for. In this matter they have not recently been very successful, but it was necessary for the Krupps, in view of their possession of a monopoly, to be ready for all probable or even possible demands. An illustration of Krupp's armour-plate rolling shop is given on page 342.

Anti-balloon guns.

Only one of the three Krupp anti-balloon guns concerns the naval Service. This is a 4·1-in. 35-calibre 40-pr. gun on a pedestal pivot base, designed to be mounted in cruisers and destroyers, though, of course, capable of being mounted in battleships also. This gun is illustrated on page 344. The other types are a 9-pr. on a field mounting and a 12-pr. mounted on a special motor, both for land service, but generally the 12-pr. and the naval 4·1-in. are on the same principle. The pivot mounting gives the gun an all-round training, and it can be fired at any vertical angle from 0 degree to 75 degrees. The gun itself weighs about 27½ cwt. and the mounting 31½ cwt., giving a total weight approximating to nearly 3 tons. The projectile weighs 39·7 lb., and the initial velocity is 2296 ft.-secs. The extreme horizontal range is estimated to be about 14,000 yards, and the range in altitude 12,400 yards. The diagram on page 345 gives the trajectory as shown over Mont Blanc and the Aiguille du Midi. The trunnions and revolving mechanism are at the breech end of the gun. For recoil a "differential" system is adopted without buffer, and with an air run-out apparatus above the gun barrel.

With regard to the use of the gun, it has been constructed to meet the conditions required by a quickly-moving target, capable of

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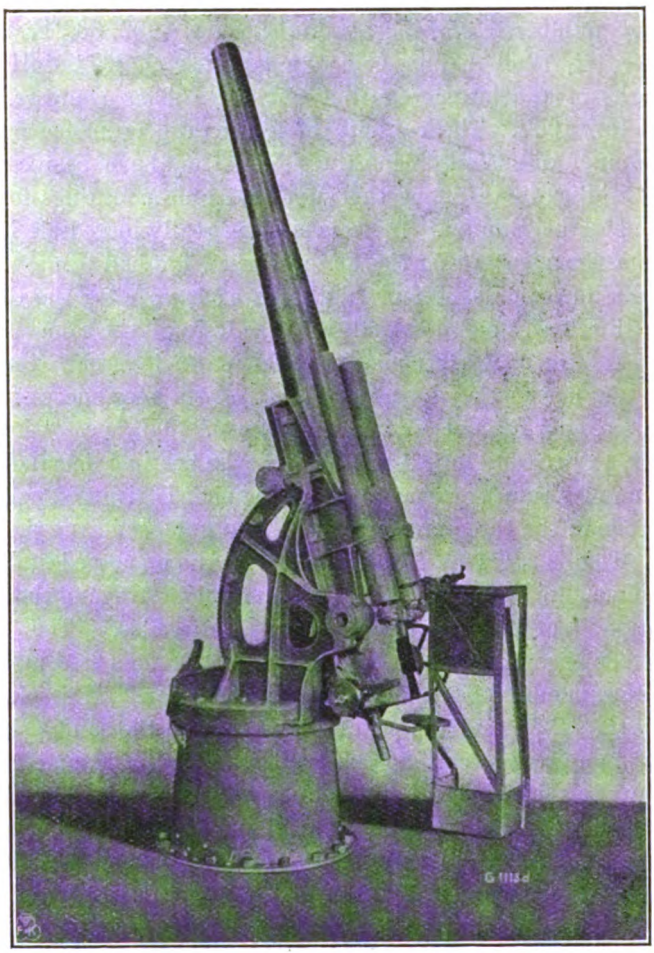
rapidly changing both its direction and elevation. In the case of the Zeppelin this movement is at the rate of nearly 50 ft. per second. The gun, therefore, must have an unlimited lateral field of fire and a high vertical range. In order to provide for equilibrium and the varying force of recoil at different vertical angles of laying, an

KRUPP ANTI-BALLOON GUN.



A 4-IN. 35-CALIBRE GUN ON SHIP MOUNTING.

ingenious arrangement of compensating springs has been provided. The sighting is effected by a combination of direct observations of position and range-finding made necessary by the special conditions, and the gun-layer, who keeps the gun laid on the moving target, has an assistant whose duty is to move the index-piece of the sight in

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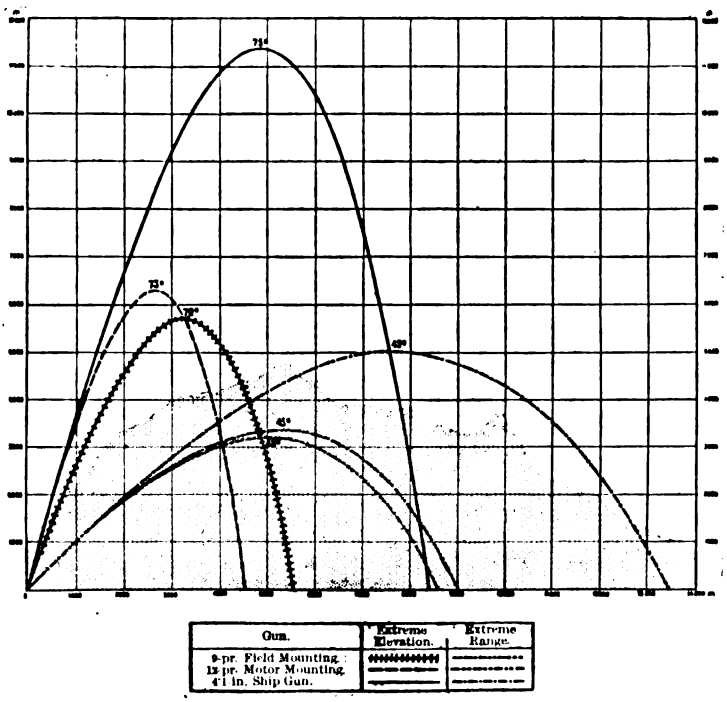
accordance with changes in range determined by the range-finder. Relations between range and altitude are shown by curves marked on a drum, which latter is fixed to the frame of the range-finder, and is rotated in correspondence with the altitude, the index marking the range.

It is not thought that shrapnel used by such a gun, bursting in the neighbourhood of the balloon, would sufficiently tear its envelope for its destruction, especially if the gas were contained in interior ballonets carried in a metal framework. The danger would be



Mont Blanc and the Aiguille du Midi seen from the East, showing trajectory of Krupp 35-calibre Balloon Guns.

greater, no doubt, if the shell passed through the balloon, but the maximum effect would be attained by a shell bursting within the envelope, and with this object delicate fuses have been tried—independent of atmospheric variations and therefore mechanical—and it has been suggested that the gas in the balloon might be set in flame by a chemical reaction between the hydrogen and some matter carried in the head of the projectile. In order that the flight of the shells may be observed for correction of elevation or range, a smoke-producing type of shell has been introduced with success.

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AUSTRIA-HUNGARY.

Types of guns.

Not much can be said concerning the ordnance now being made for the Austro-Hungarian Navy. The latest types are being tried by the naval authorities, and the details are confidential. The ships of the Rodetzky class have as their principal armament four 12-in. Skoda guns of 45 calibres, which fire a 981 lb. projectile, with a powder charge of 247 lb., initial velocity of 2624 ft., and muzzle energy, given in the Skoda table, of 14,230 tons, capable, according to the De Marre formula, of perforating 36·7 in. of steel at the muzzle. The Skoda Works at Pilsen have also a 50-calibre 12-in. gun, calculated, with the same projectile, a powder charge of 264½ lb., initial velocity of 2788 ft., and muzzle energy stated to be of 16,124 tons, of perforating 49·7 in. of steel according to the same formula. The latter is presumably the gun now under trial, no mention having been made of a larger calibre. Both these guns fire one round per minute. The Skoda guns are built on the jacket or jacket and hoop system, and the rifling of the tube, at first progressive, becomes helicoidal, and turns from left to right. It is claimed for these guns that their longitudinal and circumferential strength is very great, owing to the system of construction, the homogeneous quality of the steel, its high elastic limit, and its great breaking strain. The breech mechanism is of the sliding block type, with some resemblance to the Krupp mechanism. The Skoda tables show guns of 50, 45, and 40 calibres, from the 12-in. gun downward to the 6-pr., and there is a 35-calibre 4·7-in. for the turrets of the Danube monitors. The ammunition supply permits of loading the gun in any position of direction or inclination.

Armour-plate.

Austrian armour-plating comes from the Poldihütte works, near Prague, and the Witkowitzer Bergbau- und Eisenhütten-Gewerkschaft, at Witkowitz, in Moravia. Concerning the former little is known. The latter is a much more important establishment, and in the *Naval Annual* last year some of its armour-plates were illustrated, with accounts of the trials, while a brief account of the establishments was given. No particulars concerning later productions or trials are available, but some further account of the resources of the establishment may be of interest, in view of the anticipated rapid developments of the Austro-Hungarian fleet, for which the Witkowitz works are evidently preparing. The buildings now cover over 30,000 square yards, and include steel works, rolling mills, and armour-plate works. In the steel works there are Siemens-Martin furnaces capable of producing 20,000 tons of ingots for armour-plates per annum, and the whole works are supplied with electric and hydraulic cranes and

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transporters for charging furnaces and dealing with ingots. There is an extensive gas-producer plant on the Kerpely system, and the hot ingots up to 80 tons are conveyed by special protected trucks to the rolling mills. In the latter are gas-heated regenerative furnaces, and a great modern rolling plant, with powerful cranes and machinery for dealing with the heavy weights now required, operated by hydraulic and electric means to a total of about 11,000 horse-power. In the armour-plate works Siemens regenerative gas furnaces are used for heating plates and bars. The plant is very powerful and modern, and includes bending presses of 10,000, 8000 and 2000 tons. The equipment provides for the planing, drilling, and hardening of plates by the Krupp process, and for all the requirements in the production of armour-plate of every kind. The electric overhead cranes and transporters, and the railways of normal and small gauge running through the works, are on an extensive scale. Plates can be produced in a finished state to the extent of about 9000 tons yearly. Individual plates have a maximum of 36 tons weight, about 10 ft. 6 in. in width and 24 ft. 6 in. in length. It will thus be seen that the Witkowitz works are in a position to undertake the major part in producing the armour for the Austro-Hungarian Navy, and that shipbuilding is not likely to be delayed by any slowness of supply.

ITALY.

Torpedo factory.

In writing in the *Naval Annual* last year on the guns, torpedoes, and armour of the Italian Navy, a slight error was made in saying that the Government had no gun or torpedo factory of its own. There is such a factory in the arsenal at Spezia, and 8-in. guns have been produced there. More recently the Admiralty has decided to enter upon the manufacture of its own torpedoes, and an admirably equipped establishment is now at work in the arsenal at San Bartolomeo. A great many torpedoes have already been turned out there, and it is believed that all the torpedoes required for the Fleet will henceforth be made by the government establishment. A considerable saving is expected to result.

In what has preceded there has been no attempt to deal with armour and ordnance questions from any other than a generally descriptive point of view, making use of such information as inquiries on a considerable scale have made available. It has been seen that, while a veil of secrecy is thrown over much that is going forward, the progress in ordnance matters is general and rapid in all navies.

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BRITISH RIFLED ORDNANCE.

Ordnance.										Charge (cordite).		Projectile.						Ballistics (with full charges).						
Nature.					Chamber.		Rifling.												Perforation of wrought iron.					
Calibre or Pr.	Weight.	Mark and Service.*	Total length in inches.	Length of Bore, Including Chamber.	Diameter (at largest).	Length to base of projectile.	Twist one turn in. Least at breech.	Twist one turn in. Greatest at muzzle.	System.†	Weight.	Size.	Diameter.	Weight.	Bursting Charge of Common Shell.	Value of $\frac{d^3}{w}$.	Value of $\frac{w}{d^3}$.	Muzzle velocity.	Total muzzle energy.	At muzzle.	At 1000 yards range.	At 2000 yards range.	At 3000 yards.	Perforation Krupp steel, 3000 yards. Uncapped Shot.
B.L. GUNS.				cals.	ins.	ins.	cals.	cals.		lbs. oz.		ins.	lbs.	lbs. oz.			f. s.	ft. tons.	ins.	ins.	ins.	ins.	ins.
16·25-in.	110½ tons.	III.	524·0	30·0	21·125	84·5		30		960‡ S.B.C.	..	16·25	1800	‡‡193 **179¼	0·147	0·420	2087	54,390	38·0	34·6	31·7	29·4	13
13·5-in.	69 & 67 tons.	I. II. III.& IV.	433·0	30·0	18·0	66·5		30		187 8	..	13·5	1250	**85	0·146	0·508	2016	35,230	33·0	30·2	27·6	25·2	11
12-in.	46 tons.	VIII. Wire	445·5	35·43	16·0	70·0		30		167 8	50	12·0	850	80–1 $\frac{9}{11}$	0·169	0·492	2367	33,020	37·0	32·7	29·4	26·6	11½
12-in.	50 tons.	IX. Wire	496·5	40·0	17·5	87·2		..		201 8 9 8	50 33¾	12·0	850	„	..	..	2481 §2580	36,290 39,280	39·7 42·0	35·4 38·0	31·6 34·6	28·7 32·0	12½ 14
12-in.	58 tons.	X. Wire	558·0	45·0	..	..		..		325 0 M.D.	..	12·0	850	..	..	..	2900	47,697	51·0	46·2	42·0	38·4	17
10-in.	31 tons.	Triumph & Swiftsaure	483·0	45·0	14·0	64·5		..		..	..	10·0	500	..	..	..	§2800	§27,205	39·5	34·6	30·2	27·0	11¾
10-in.	29 tons.	II. III. III.A & IV.	342·4	32·0	14·0	54·0		30		76 0	30	10·0	500	37¾	0·200	0·500	2040	14,430	24·8	21·8	19·3	17·0	7½
9·2-in.	21 & 22 tons.	I. & II.	255·8	25·56	11·0	44·0		35		42 0	30	9·2	380	18	0·223	0·488	1781	8,356	18·8	15·9	14·4	12·4	5½
9·2-in.	24 & 22 tons.	III. V. VI. VI.Abc & VII.	310·0	31·5	12·0	43·0		30		53 8	30	9·2	380	‡‡33 **30 $\frac{6}{16}$	0·223	0·488	2065	10,910	22·9	19·8	17·2	15·5	6¾
9·2-in.	25 tons.	Wire VIII.	384·0	40·08	10·5	53·15		..		63 0	40	9·2	380	..	0·223	0·488	2347	14,520	27·6	23·9	20·7	18·0	7¾

Modified Pl. Section, the last in the new guns. newer patterns.

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9·2-in ††	28 tons.	Wire X.	442·35	46·6	13·0	71·215	..	Various in the	P. Elswick, Hook, or	103	0	44	9·2	380	..	0·223	0·488	{2640 §2800	18,400 20,685	33·3 36·0	28·9 31·2	25·0 27·4	22·0 24·0	9½ 10½
7·5-in.	16 tons.	Triumph & Swiftsure	386·7	50·0	..	46	..			..	..		..	200	..	0·281	0·474	§2800	10,883	29·0	24·9	21·4	17·8	7¾
7·5-in.	14 tons.	..	337·5	45	11·1	55	30			47 0 30 2 8 2½			7·5	200	18½	0·281	0·474	2600	9,340	26·0	22·3	18·8	15·7	6¾
6-in.	5 tons.	III.	170·7	25·53	8·0	26·75	35						6·0											
6-in.	5 tons.	IV. VI.	173·5	26·0	8·0	26·75	35 30			14	12	20	6·0	100	7 4/16 **9 13/16	0·360	0·463	1960	2,665	13·4	10·7	8·9	7·0	3
6-in.	7·4 tons.	VII. VIII.	269·5	45	8·5	32·7	30			20	0	20	6·0	100	9	0·360	0·463	{2493 §2750	4,308 5,250	19·6 22·3	15·3 18·0	11·9 14·6	9·8 11·6	4¼ 5
4-in.	23 cwt. 26 cwt.	II.II$_A$.III.III$_A$. IV.V.& VI.	120·0	27·0	5·3	18·5	120	30		3	1	5	4·0	25	1 12/16 3 9/16	0·640	0·391	1900	625	7·7	5·4	4·0	3·0	..

* The Roman numeral is the number of the pattern given. Further differences in pattern are indicated by letters a, b, and c. Some details of the 12-in. Mark X. uncertain.
† P. means Polygroove; Pl., Plain; ‡ Cordite has not been introduced for this gun; ◊ Estimated with M.D. cordite;
** Cast steel; †† A 50-calibre 9·2-in. gun is under construction; ‡‡ Forged steel.

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BRITISH RIFLED ORDNANCE—*continued.*

Ordnance.										Charge. (full).	Charge (cordite).		Projectile.					Ballistics (with full charges).					
Nature.					Chamber.		Rifling.													Perforation of wrought iron.			
Calibre or Pr.	Weight.	Mark and Service.	Total length in inches.	Length of Bore, including Chamber.	Diameter.	Length to base of projectile.	Twist one turn in: Least at breech.	Twist one turn in: Greatest at muzzle.	System.*	Weight.	Weight.	Size.	Diameter.	Weight.	Bursting Charge of Common Shell.	Value of $\frac{d^2}{w}$.	Value of $\frac{w}{d^3}$.	Muzzle velocity.	Total muzzle energy.	Muzzle energy per ton of gun.	At muzzle.	At 1000 yards range.	At 2000 yards range.	At 3000 yards range.
QUICK-FIRING GUNS (using metal cases)				cals.	ins.	ins.	cals.	cals.		lbs.	lbs. ozs.		ins.	lbs.	lbs.			f. s.	ft. tons.	ft.tons.	ins.	ins.	ins.	ins.
6·0 in.	7 tons	I. & III. / II. (Wire)	249·25	40	..	..	60	30	P.	..	13 4	30	6·0	100·0	..	0·360	0·463	2200	3356	479	15·9	12·7	**10·2**	8·2
6·0 in. Q.F.C.	5 „	I. to VI.	169·1 / 166·6	26·2 / 26·6	..	..	..	..										1913	2537	362	13·0	10·3	**8·2**	6·4
4·7 in.	41 cwt. / 42 „	I. II. III. & IV. Wire	194·1	40	..	..	100 / 0	34·4 / 30	E.O.C.	..	5 7	20	4·72	45·0	..	0·495	0·428	2188	1494	711	12·4	9·2	**6·6**	5·0
4 in.	26 cwt.	I. II. III. Wire converted guns	165·25 / 120	40 / 28	..	..	..	30	M.Pl.	..	3 9	15	..	25·0	..	0·640	0·390	2300 / 2177	917 / 821	705 / 569	10·5 / 9·5	6·9 / 6·5	**4·9 / 4·6**	3·3 / 3·0
12-pr.	12 cwt.	I.	123·6	40	..	..	120 / 0	28 / 30	E.O.C. / M.Pl.	..	1 15	10	3·0	12·5	..	0·072	0·463	2210	423	677	8·1	5·3	**3·5**	2·4
12-pr.	8 cwt.	I.	87·6	28	..	..	60 / 0	28 / 30	E.O.C. / M.Pl.	..	13¾	10	3·0	12·5	..	0·072	0·463	1607	223·8	544	4·9	3·2	**2·4**	..
Hotchkiss . 6-pr...	8 cwt.	I. & II.	97·63	40·0	..	..	180	29·9	M.Pl.	..	b7¾	5	2·24	6·0	..	0·836	0·534	1818	137·5	344·8	4·8	2·8	..	..
Nordenfelt . 6-pr...	6 cwt.	I. II. & III.	104·4	42·3	..	..																		
Hotchkiss . 3-pr ..	5 cwt.	I. & II.	80·63	40	..	..	25	25	M.Pl.	..	b6⅜	5	1·85	3·3	..	1·037	0·521	1873	80·3	321·2	4·1	2·1	..	..
Nordenfelt . 3-pr...	4 cwt.	I. L.	91·5	45·4									..	..	..	..	..	1920	84·3	337·2	4·3	2·2	..	..
MACHINE GUNS.										grains.				grs.										
Maxim, 1 bar 0·45 in.	63 lbs.	I.	45·0	..	..	..	10	27	Enf'ld	31 Cordite	..	..	0·450	480	..	2·952	0·751	..	..	..	Same as M.H. Rifle.			
Maxim, ·303			42·38				10	25·6	Metf'd				0·303	215	..	..	..	..	..	..	Same as Lee-Metford.			

* P. means Polygroove; M.Pl., Modified plain.

b With 4 grs. R.F.G.

Note.—An armour-piercing shell has now come in for the 6-in. guns.

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AUSTRIAN NAVAL ORDNANCE.

Designation by Calibre, in centimètres, length in calibres, and type of gun	30·5 L. 45 Skoda.	30·5 L. 35 K. 80	24 L. 40 K. 01	24 L. 40 K. 94	24 L. 35 K. 86	19 L. 42 Skoda.	15 L. 40 Skoda.	15 L. 35 K. 86	15 L. 35 K. 80	12 L. 40 Skoda.	12 L. 35 K. 80	12 L. 35 K. 87
Calibre, in inches	12·01	12·01	9·45	9·45	9·45	7·5	5·91	5·87	5·87	4·72	4·72	4·72
Length — Total, in feet	45·0	35·11	31·6	31·4	27·60	26·3	19·5	17·13	17·13	15·74	13·8	13·8
Length — Rifled Portion, in ins.	319·7	314·8	291·3	286·2	237·7	239·7	182·6	151·4	153·6	147·6	128·5	126·3
Length — Powder Chamber in ins.	68·3	69·9	59·0	63·7	65·2	51·8	35·4	37·3	35·4	28·3	24·0	26·3
Length — Of bore in calibres	45	35	40	40	35	42	40	35	35	40	35	35
No. of Grooves	92	68	72	72	25	56	44	36	36	36	32	36
Twist in calibres	40–25	45–25	..	..	26·9	..	..	45–25	25	25	25	25
Weight — Gun, tons	51–9	47·2	21·5	27·8	26·6	11·6	5·18	5·7	4·69	1·97	2·25	2·31
Weight — Breech Block, in lbs.	3450·2	3306·9	..	..	1776·9	..	..	445·3	463·0	..	253·5	211·6
Weight — Steel Shell „	992	1003·1	474	474	474·0	198	112·5	112·5	86·0	52·4	57·3	57·3
Weight — Common Shell „	..	1003·1	474	474	474·0	..	112·5	112·5	69·9	52·4	57·3	57·3
Weight — Shrapnel Shell „	..	..	..	..	..	..	..	112·4	71·9	..	57·3	57·3
Weight of Bursting Charge — Case Shot „	..	..	..	..	..	..	..	..	..	..	..	..
Weight of Bursting Charge — Steel Shell „	..	10·6	..	..	5·1	..	..	1·3	1·76	..	0·55	0·55
Weight of Bursting Charge — Common Shell „	..	97·7	..	..	17·9	..	..	5·29	3·86	..	2·2	2·2
Weight of Bursting Charge — Shrapnel Shell „	..	..	..	..	..	..	..	1·26	1·10	..	0·57	0·57
Weight of Firing Charge — Steel Projectile, in lbs.	..	156·5 24 cm.N	120·6	91·5	99·2N	56 N	28·8	22·5 15 cm.N	38·8*	9·7	19·8 B	12·13N
Weight of Firing Charge — Common Shell, in lbs.	..	156·5 N 24 cm.N		91·5	99·2N			22·5 15 cm.N	38·8*		19·8 B	12·13N
Weight of Firing Charge — Shrapnel, in lbs.	..	..	..	..	..	..	..	..	..	..	..	..
Weight of Firing Charge — Exercising, in lbs.	..	154·3B	..	..	..	..	..	28·7	19·6	..	11·0	6·6 N
Weight of Firing Charge — Saluting „	..	19·8 O	..	..	15·4 O	..	..	4·74	4·74 O	..	2·4 O	2·4 O
Muzzle Velocity, in feet	2625	1969	2595	2264	2100	2700	2608	2133	1969	2264	1755	2133
Muzzle Energy — Total, foot-tons	47,402	26,970	22,121	16,845	14,500	10,025	5308	3549	2312	3554	1215	1808
Muzzle Energy — Per inch circumference, foot-tons	..	714·8	..	..	488·3	..	..	192·5	125·4	..	82·5	122·2
Thickness of Iron, perforated inches at Muzzle, by Tresidder's formula	..	30·1	34·5	29·0	25·8	27·3	22·0	16·1	12·6	13·7	9·7	12·9
Perforation of Krupp Steel, 3000 yds., inches	..	10	9½	8	7	6¾	5	3½	..	..	..	..

NOTE.—C for cube powder; * prismatic powder: O, ordinary powder; B, brown prismatic. N, nitro-glycerine smokeless powder.
There are other types of Krupp guns, also Skoda 7-cm., Skoda and Hotchkiss 47-mm., and Hotchkiss 37-mm.

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DANISH NAVAL ORDNANCE.

Designation by Calibre, in centimètres, length in calibres, and type of gun	26 L. 35 Krupp	24 L. 40 1893 Krupp.	24 L. 40 1896 Canet.	24 L. 43 1901 Bofors.	24 L. 43 1906 Bofors.	21 L. 35 Krupp.	15 L. 35 1888 Krupp.	15 L. 43 1896 Bofors.	15 L. 43 1901 Bofors.	15 L. 50 Bofors.	12 L. 40 Krupp.	8·7 L. 40 Krupp.	7·5 L. 55 Danish semi-aut.	5·7 L. 44 Hotch-kiss.	4·7 L. 44. Hotch-kiss.	4·7 L. 50 Danish semi-aut.
Calibre, in inches	10·24	9·45	9·45	9·45	9·45	8·24	5·87	5·87	5·87	5·87	4·72	3·43	2·95	2·24	1·85	1·85
Total length, in feet	29·86	31·50	31·50	33·86	33·86	24·05	17·12	21·17	21·17	24·46	15·75	11·41	13·53	8·13	6·72	7·71
Length of Bore, including Powder Chamber — in inches	327·6	349·7	358·5	397·0	397·0	264·5	189·0	244·0	247·4	286·4	176·4	126·8	152·6	89·8	74·1	87·6
Length of Bore, including Powder Chamber — in calibres	32·0	37·0	37·9	42·0	42·0	32·1	32·2	41·6	42·1	48·8	37·3	37·0	51·7	40·0	40·0	47·3
Number of Grooves	60	72	60	60	60	48	36	44	44	44	36	32	28	24	20	20
Twist of Rifling, in calibres	70–25	00–25	72–33	72–33	33	50-25	70–25	70–30	70–30	30	42–25	45–20	30	180–30	25	40–25
Total weight, including Breech-gear, tons	27·3	25·4	22·9	24·3	24·5	13·3	4·7	5·5	5·5	7·5	2·26	1·13	0·87	0·36	0·23	0·32
Weight of — Breech Block, tons	2006	1691	871	851	802	904	390	295	252	313	205	136	83	60	40	40
Weight of — Armour-piercing Projectile, lbs.	452	353	353	353	353	238	112	112	112	112	..	..	..	..	..	..
Weight of — „ Shell „	..	353	353	353	353	..	..	112	112	112	44	20	15	6	3·3	3·3
Weight of — Common Shell, lbs.	452	353	353	353	353	238	112	112	112	112	44	20	15	6	3·3	3·3
Weight of Bursting Charge — Armour-piercing Shell, lbs.	..	5·3	5·3	5·3	5·3	..	..	1·7	1·7	1·7	1·7	0·7	0·7	0·25	0·11	0·11
Weight of Bursting Charge — Common Shell, lbs.	29·8	24·9	24·9	21·4	21·4	16·5	7·2	7·2	7·2	7·2	2·8	1·3	0·7	0·19	0·14	0·14
Weight of Firing Charge, lbs.	191·8	91·5	77·2	83·8	97·0	105·8	41·9	22·0	22·5	34·2	11·3	4·7	4·0	1·3	1·1	1·4
Muzzle Velocity, feet	2018	2362	2362	2477	2641	2018	1854	2297	2297	2690	2362	2362	2625	2297	2346	2723
Muzzle Energy — Total foot-tons	12750	13640	13640	15000	17060	6712	2678	4100	4100	5642	1702	767	737	218	126	170
Muzzle Energy — Per inch circumference, foot-tons	396·4	459·5	459·5	505·4	574·7	259·3	145·2	222·4	222·4	306·1	114·8	71·2	79·5	31·0	21·7	29·3
Perforation at Muzzle, wrought iron, Tresidder's formula, inches	22·8	26·6	26·6	28·6	31·5	18·5	13·2	18·3	18·3	23·2	13·3	10·5	11·7	6·8	5·8	7·2
Perforation Krupp Steel, 3000 yards, inches	6·2	9·1	9·1	9·8	10·7	4·2	3·3	6·2	6·2	7·9	..	..	..	..	..	..

There are also some older 1·46-inch, 1-pr. Hotchkiss guns.

Corrected to February, 1910.

DUTCH NAVAL ORDNANCE.

	Krupp Breech Loading Q.F.											
Designation by Calibre, in centimètres	28 Q.F.	28	28	24 Q.F.	24 Q.F.	21	21	15 Q.F.	15 Q.F.	15 Q.F.	15 Q.F.	12 Q.F.
Calibre, in inches	11·0	11·0	11·0	9·4	9·4	8·2	8·2	5·9	5·9	5·9	5·9	4·72
Total Length, in feet	40·0	20·0	27·56	31·5	31·5	24·06	24·06	17·12	19·55	19·55	19·55	15·75
Length of Rifled Portion of Bore, in inches	..	170·34	244·55	..	..	222·75	212·32	..	..	..	..	..
Length of Powder Chamber „	..	35·43	42·71	..	..	30·90	41·34	..	..	..	..	..
Length of Bore, in Calibres	40	18·79	27·00	37	37	32·11	32·11	32	37	37	37	37
Number of Grooves	..	64	64	..	..	48	64	..	..	..	..	..
Depth of Grooves, inches	..	0·04	0·04	..	..	0·4	0·4	..	..	..	..	..
Twist of Rifling, in Calibres	..	45	70–25	..	..	45–25	45–25	..	..	..	..	2·35
Total Weight, in tons	29·53	27·2	27·06	24·1	24·39	13·28	13·96	3·83	4·33	4·78	5·11	..
Firing Charge — Armour-piercing Projectile, in lbs.	..	132·3	185·2	..	..	94·8	119	..	..	..	..	..
Firing Charge — Common Shell „			154·3									
Weight — Armour-piercing Projectile „	595·24	537·76	760·60	374·80	374·80	308·64	308·64	100	100	90·38	90·38	52·35
Weight — Common Shell „		476·18	476·18									
Weight — Case Shot „		..	..									
Bursting Charge — Armour-piercing Projectile „	..	..	..	..	..	..	..	..	..	..	..	..
Bursting Charge — Common Shell „												
Muzzle Velocity, feet	2920	1558·5	1591	2690·5	2789	1798	1903	2133	2221	2444	2789	2221
		1673	1706									
Muzzle Energy — Total, in foot-tons	15,191	9425	13,345	18,809	20,210	6920	7750	3169	3469	3744	4874	1807
Muzzle Energy — Per inch Circumference, foot-tons	..	..	..	..	..	..	..	..	..	..	..	..
Perforation at Muzzle, in inches (Krupp Steel)	24·25	..	11	18·1	19·1	8·25	9	6·1	6·5	9·8	11·5	4·7
Perforation Krupp Steel, 3000 yards	18·50	..	8·25	14	14·2	5·7	6·3	3·5	3·9	5·7	7·1	..

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FRENCH NAVAL ORDNANCE.

Date and Pattern of Gun.	Model 1902.	Model 1893–96.				Model 1893.					Model 1887.				1884.					1881.						
Desig. by Calibre, in cms.	30·5	30·5	27·44	24·0	19·4	34·0*	30·5	27·44	24·0	19·4	34	30·5	27	19	34	27	24	16	14	34 long.	34 short.	27	24	16 heavy.	16 light.	14
Calibre, in inches	12·01	12·01	10·8	9·45	7·64	13·39	12·0	10·8	9·45	7·64	13·39	12·0	10·80	7·64	13·39	10·80	9·45	6·49	5·45	13·39	13·39	10·8	9·45	6·49	6·49	5·46
Total length, in feet	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	28·47	24·89	17·04	..	33·69	25·32	27·12	23·70	15·14	15·14	14·3
Length of Bore, in ins.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	380·6	280·2	306·9	269·3	180·9	180·9	162·6
Length of Bore, in cals.	45	40	40	45	45	35	40	40	40	40	42	45	45	45	30	30	30	30	30	28·5	21·0	28·5	28·5	28	28	28
Number of Grooves	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	50	50	42
Depth of Grooves, inches	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0·067	0·067	0·059	0·055	0·039	0·039	0·035
Rifling Twist	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	7°	7°	7°	7°	7°	7°	7°
Total weight, in tons	..	44·4	34·5	23·6	12·5	52·9	45·9	34·9	22·4	10·6	60·0	49·2	37·1	10·6	50·8	27·7	17·9	5·4	3·15	52·2	47·2	27·4	17·7	4·9	3·9	3·2
Weight of Firing Charge — Armour-piercing Projectile, lbs.	..	246	188·5	145½	74	243·0	198·4	114·6	110·2	44·1	220·5	198·4	114·6	44·1	388·0	200·6	..	42 5	..	388·0	337·3	203·9	149·9	42·5	32·6	..
Weight of Firing Charge — Com. Shell lbs.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	200·6	..	42·5	27·1	337·3	368·2	203·9	149·9	42·5	32·6	27·1
Weight — Armour-piercing Projectile lbs.	750	750	562	375	190	925·9	643·8	476·2	317·5	165·3	925·9	643·8	476·2	165·3	925·9	476·2	317·5	99·2	..	925·9	925·9	476·2	317·5	99·2	99·2	..
Weight — Com. Shell „	..	750	562	375	190	925·9	643·8	476·2	317·5	165·3	925·9	643·8	476·2	165·3	771·6	396·8	264·6	99·2	66·1	771·6	771·6	396·8	264·6	99·2	99·2	66·1
Muzzle Velocity, in f.-s., A.P. Projectile	2870	2650	2650	2870	2870	2400	2625	2625	2625	2625	2560	2625	2625	2625	1969	1969	1969	1969	1969	1969	1804	1969	1969	1969	1821	1936
Muzzle Energy — Total, in f.-t.	42890	36782	27186	21445	10890	36850	30750	22750	15170	7898	42040	30750	22750	7898	24900	12800	8539	2668	1777	24900	20880	12800	8539	2668	2080	..
Muzzle Energy — Per in. circ., f.-t.	..	..	..	..	..	..	815·8	670·7	511·1	329·1	..	815·8	670·7	329·1	591·9	377·5	287·7	130·8	103·9	591·9	496·6	377·5	287·7	130·9	121·3	..
Perforation at Muzzle† wrought iron, inches.	46·0	42·7	38·8	37·0	29·0	36·8	37·3	33·7	29·4	23·4	40·8	37·3	33·7	23·4	27·6	22·0	19·2	13·0	10·7	27·6	24·2	22·0	19·2	13·0	11·6	..
Perforation Krupp Steel 3,000 yds.	15½	13½	11½	10½	6¾	11½	11	9	7½	5½	13	11	9	5½	7½	6	5¼	3	..	7½	7	6	5¼	3	..	..

* For special purposes.

† By Tresidder's formula.

A new type of the 1902 Model has been tried with 7·6-in. and 6·4-in. calibre. These will probably be replaced by model of 1906, 12-in. 970 lb. projectile, velocity 2840 f.-s., and 9·4-in. 220 lb. projectile, velocity 2840 f.-s.

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FRENCH NAVAL ORDNANCE—*continued.*

Date and Pattern of Gun.		16·47.*	Q.F. Guns. Mod. 93-6. 16·47	16§	16‡	14§	14‡	Mod. 92. 10	Mod. 91. 10	Mod. 81. 10‡
Desig. by Calibre, in cms.		16·47		16·47		13·86			10·00	
Calibre, in inches		6·46		6·46		5·44			3·94	
Total length, in feet		26·9								
Length of Bore, in inches		..								
Length of Bore, in calibres		47·5	45	45	30	45	30	55	45	26
Number of Grooves		..								
Depth of Grooves, inches		..								
Rifling Twist		..								
Total weight, in tons		8·5	8·1	6·89	4·92	4·13	3·84	2·19	1·62	1·18
Weight of Firing Charge	Armour-piercing Projectile lbs.	..	44	30·2	19·0	16·1	12·8	8·16	8·16	5·07
	Common Shell „	..								
Weight	Armour-piercing Projectile lbs.	115	115	99·21		66·14			30·87	
	Common Shell „	..	115	99·21		66·14			30·87	
Muzzle Velocity, in ft.-secs.		3110	2870	§2625	2100	2625	2100	2500	2428	1840
Muzzle Energy	Total, in foot-tons	7185	6568	4730	3061	3160	2022	1340	1266	725
	Per in. circ. foot-tons	..	..	233·5	150·9	184·9	118·7	..	..	..
Perforation at Muzzle, wrought iron, inches		26·3	24·5†	20·0†	14·4†	17·7†	12·7†	13·0†	12·5†	8·2†
Perforation Krupp steel, 3,000 yards		5¾	5¼	4	..	..	..	..	..	..

* Experimental gun not in service. † By Tresidder's formula. ‡ Models 1881 and 1884 converted guns.
§ There are three models of the years 1887, 1891 and 1893, of slightly different weights from the above.

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ITALIAN NAVAL ORDNANCE.

	Armstrong Breech Loading.					Q.F.	Armstrong B.L.	Armstrong Quick-Firing.					
Designation by Calibre, in centimètres .	43·1†	43·1† Early Pattern. 1882.	34·3	30·5	25·4	20·3	15·2	15·2	15·2	15·2	12·0	12·0	7·6
Calibre, in inches	17	17	13·5	12	10	8	6	6	6	6	4·7	4·7	3·0
Length — Total, in feet . . .	40·75	39	36·09	..	34·8	..	16·9	17·0	20·9	20·9	16·2	13·0	..
Length — Rifled Bore, in inches .	346·8	315·7	..	..	..	..	..	..	..	.	189	..	..
Length — Powder Chamber, in inches .	84·5	98	..	..	..	..	..	..	..	.		..	..
Length — Bore, in Calibres . . .	27	26	..	40	40	45	32	33·0	40	40	40	35	40
No. of Grooves	82	82	56	..	..	..	..	..	..	..	22	22	..
Twist of Rifling, in Calibres . .	50	50	..	..	..	..	..	..	..	..	34·4	..	..
Total Weight, in tons	104·3	101·5	67·9	..	30	..	5·4	5·1	5·7	6·5	2·05	1·69	0·6
Firing Charge — Armour-piercing projectile, lbs.	900·0	725	630·5	..	..	..	46	46	46	17·6*	..	..	..
Firing Charge — Common Shell, . „	600	480	..	..	..	..	..	.	..	..	..	..	..
Weight — Armour-piercing projectile, „	2000	2000	1250	850	448	250	98	98	100	100	45·0	36·0	12
Weight — Common Shell, . . „	2000	2000	1250	..	..	..	..	..	..	..	..	36·2	..
Weight — Shrapnel „ . . „	2017	2017	1250	..	..	..	..	..	..	..	..	29·8	..
Weight — Case Shot . . „	..	..	..	..	..	..	..	..	..	..	..	..	..
Bursting Charge — Armour-piercing projectile, „	32	32	17·4	..	..	..	2·0	2·0	5·1	4·4	..	1·83	..
Bursting Charge — Common Shell, . „	60	60	87·1	.	..	..	..	..	..	..	..	3·02	..
Bursting Charge — Shrapnel „ . . „	5	5	4·25	..	..	..	..	..	..	..	..	0·35	..
Muzzle Velocity, in ft.-secs. . .	1992	1935	2016	2500	2460	2600	1952	1985	2149	2297	2180	..	2625
Muzzle Energy — Total, foot-tons . .	55,030	51,930	35,230	36,925	18,798	11,730	2577	2705	3169	3622	1490	..	573
Muzzle Energy — Per inch circumference, foot-tons	1035	976·3	830·8	..	..	..	..	..	..	..	..	..	..
Perforation at Muzzle, inches of iron by Tresidder's formula . . .	36·7	35·0	33·0	40·0	31·0	28·3	13·2	13·6	15·4	17·0	12·4	..	10·2
Perfo ration Krupp Steel, 3000 yds., inches	12½	12	11	13	9	7	..	..	..	3½	..	..	..

* Ballistite. † There are four types of these guns, viz.—Lauria, Lepanto, Italia, Morosini.

Note.—There is also a 6-inch quick-firing gun, 40 cals. M.V., 2600 f.s.

The weight of Ballistite charges is not known, but it is understood that they give the same ballistics as the powder charges shown.

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NAVAL ORDNANCE OF NORWAY.

	Modern Guns.							
Designation by Calibre, in cms.	21	21 Q.F.	15	15 Q.F.	12 Q.F.	76 mm.	76 mm.	7 cm.
Calibre, inches	8·24	8·24	5·87	5·87	4·7	3·0	3·0	2·8
Total Length, feet	24·0	31·2	19·6	23·3	17·7	10·3	13·3	9·2
Length: Rifled Portion of Bore, inches	212·3	309·7	178·0	234·1	179·2	102·4	127·7	81·8
Length: Chamber, inches	49·0	48·6	39·0	32·9	26·0	15·4	20·4	19·1
Length: Bore in calibres	35·0	43·8	37·2	45·8	44·0	40	50	36·6
Number of Grooves	64	32	44	28	26	16	28	28
Twist of Rifling	46–23	∝–30	45–25	∝–30	∝–30	∝–30	30	20
Total Weight, tons	14·2	18·9	5·6	7·1	2·7	0·6	1·0	0·63
Weight of: Armour-piercing Shell, in lbs.	309	309	112·4	99·3	45	12·5	12·5	10·5
Weight of: Common Shell, in lbs.	..	..	..	..	..	..	..	..
Weight of * Firing Charge: Armour-piercing Shell, in lbs.	45·6	54	20·4	20·9	9·4	2·2	3·75	2·2
Weight of * Firing Charge: Common Shell, in lbs.	..	..	..	..	..	..	..	..
Muzzle Velocity, feet	1903	2300	2050	2625	2570	2200	2840	2230
Muzzle Energy, Total foot-tons	7760	11450	3328	4870	2060	430	695	367
Perforation through Iron by Tresidder's formula	19·3	25·6	15·4	21	15·3	8·0	11·6	7·8
Perforation, Krupp Steel, 3000 yards	4¾	6½	3¼	4	..	..	..	..

* Smokeless powder.

Corrected to February, 1910.

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RUSSIAN NAVAL ORDNANCE.

	Heavy Guns.			Q.F. Guns.		
Calibre, in inches	12	10	8	6	4·7	12-pdr.
Weight, in tons	59	32	..	..	..	..
Length, in calibres	40	45	45	45	45	50
Weight of Projectile, in lbs.	720	488	188	89	46	12
Muzzle Velocity, foot-seconds	2600	2550	2950	2600	2700	2700
Perforation, in inches, of Wrought Iron — At Muzzle	38	35	27	22½	15½	10·2
Perforation, in inches, of Wrought Iron — At 2000 yards	30	27	20	13	9	4·8
Perforation of Krupp Steel at 3000 yards	12	10½	6½	4¾	..	..

There exists a new pattern 12-in. gun of 50 calibres, but details are not published.

Corrected to February, 1910.

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SPANISH NAVAL ORDNANCE.

	Hontoria, Pattern 83. Breech Loading.								Armstrong, Pattern 83.			Armstrong. Muzzle Loading.		Armstrong. Pattrn. 81 B.L.	Krupp. Breech Loading.		Krupp. Q.F. guns.					
Designation by Calibre	32-cm.	28-cm.	24-cm.	20-cm.	18-cm	16-cm.	14-cm.	12 cm.	12-cm.	8·7-cm.	7·5-cm. long.	22·86-cm	20·3-cm	6-in.	15-cm.	12-cm.	15-cm.	14-cm.	12-cm.	75-mm.	57-mm.	47-mm.
Calibre, in inches . .	12·60	11·02	9·45	7·87	7·09	6·34	5·51	4·72	4·72	3·4	2·95	9·00	8·00	6·00	5·87	4·72	5·9	5·51	4·72	2·95	2·24	·85
Length Total length, in feet	38·7	33·8	29·0	..	21·75	19·3	16·91	14·5	13·75	7·9	7·50	13·0	11·0	14·5	17·13	11·81	19·6	20·7	..	..	..	..
Length Rifled Portion, in inches	352·4	309·1	..	..	..	170·6	149·1	126·0	135·8	75·0	70·7	104·0	102·0	126·9	..	..	..	..	..	..	..	..
Length Powder Chamber, in inches	86·8	77·1	..	..	..	49·8	53·9	39·4	19	13	13	..	..	29·7	..	..	..	..	..	..	..	..
Length Bore, in calibres	35	35	30	..	30	35	35	35	33	27	28·7	14	14·75	26·1	35	30	37	45	45	40	42	40
No. of Grooves . . .	80	70	60	50	45	40	35	30	22	20	18	6	4	28	36	32	..	..	..	..	..	..
Depth of Grooves, in ins.	0·06	0·06	0·05	0·06	0·04	0·04	0·04	0·04	0·03	0·03	0·03	0·18	0·18	..	0·06	0·06	..	..	..	..	..	..
Twist of Rifling, in cals.	From 0 to 30.								40	30	35	45	40	100 to 40	25	25	..	..	..	..	..	..
Total Weight, in tons .	47·3	32·5	20·7	11·5	8·71	6·1	4·1	2·6	2·2	0·45	0·35	12·0	9·0	4·0	4·7	2·1	4·39	4·8	2·65	0·9	0·34	0·23
Weight Armour-piercing projectile, in lbs.	1041	694·3	438·7	253·5	187·4	130·1	86·0	53·1	39·2	..	..	250·0	180·0	78·3	84·9	43·65	100	70	55	14	6	3·3
Weight Common Shell, in lbs.	879·6	586·4	370·4	213·8	..	112·4	75·0	47·2	36·4	14·1	11·5	250·0	180·0	73·6	65·5	34·61	..	..	..	..	..	..
Weight Ring Segment, in lbs.	886·3	590·8	370·4	211·6	..	112·4	75·0	47·6	38·6	15·4	11·7	..	..	83·6	..	34·61	..	..	..	..	..	..
Firing Charge Armour-piercing projectile, in lbs.	485·0	352·7	220·5	112·4	94·8	66·1	44·1	28·7	16·0	..	..	50·0	35·0	34·0	37·48	19·29	..	..	15·4	7·1	1·93	..
Firing Charge Other projectiles	463·0	319·7	220·5	..	..	61·7	..	28·7	11·9	4·0	4·0	33·0	21·0	24·9	25·4	..	..	..	..	..	..	..
Muzzle Velocity, in feet	2034	2034	2034	2034	2034	2054	2001	1988	2000	1625	1709	1339	1339	1929	2001	1887	2264	2460	2423	2100	1870	2330
Muzzle Energy Total, in ft.-tons	29850	24030	12580	7271	5374	3806	2386	1511	1087	258	233	3105	2239	2018	2357	1076	3554	2936	2238	428	145	124
Perforation at Muzzle, in inches	32·9	28·7	24·6	20·5	18·6	16·6	13·9	11·6	9·3	..	..	10·6	9·6	11·0	12·7	9·7	17·0	16·5	15·5	7·9	5·0	5·7
Perforation Krupp Steel, 3000 yards	11	8	6¼	4¾	4¼	3½	..	..														

Note.—The Carlos V. has 11-in. 45-cal. guns. M.V. probably 2500 f.s.

NAVAL ORDNANCE OF SWEDEN.

N. = belongs to the Navy. {C.A. = belongs to the Coast Artillery.}	Armstrong.		Canet.	Canet and Bofors.	Armstrong.	Whitworth.	Bofors.		Bofors.			Bofors and Finspong.	Bofors.	Stockholms Vapenfabrik and Finspong.			Bofors.	Finspong.	Stockholms Vapenfabrik.		Finspong.	Stockholms Vapenfabrik.		
	25 cm.k. m/85 C.A.	25 cm.k. m/89 C.A.	25 cm.k. m/94 N.	25 cm.k. m/94 B.C. N.	24 cm.k. m/90 C.A.	24 cm.k. m/92 C.A.	24 cm.k. m/96 C.A.	24 cm.k. m/04 C.A.	21 cm.k. m/98 N.	15 cm.k. m/98 N.C.A.	15 cm.k. m/03 N.C.A.	12 cm.k. m/94 oc.k. m/97 N.C.A.	12 cm.k. m/03 C.A.	7·5 cm.k. m/05 N.	5·7 cm.k. m/89 N.	5·7 cm.k. m/89 B oc.k. m/99 N.C.A.	5·7 cm.k. m/92 N.C.A.	5·7 cm.k. m/95 ⊙ B1/95B C.A.	5·7 cm.k. m/95 C. C.A.	5·7 cm.k. m/95 D. N.	4·7 cm.k. m/92 C.A.	4·7 cm.k. m/95 N.	3·7 cm.k. m/98 N.	3·7 cm.k. m/98 B N.C.A.
Designation by Calibre, in cms.	25·4	25·4	25·4	25·4	24	24	24	24	21	15·24	15·24	12	12	7·5	5·7	5·7	5·7	5·7	5·7	5·7	4·7	4·7	3·7	3·7
Total Length . . . mm.	8636	8636	10670	10670	8237	8544	10320	12000	9335	6768	7620	5400	6000	3970	2737	3108	2760	1478	1504	1900	1200	2572	1368	1450
Length — Rifled Portion of Bore, mm.	6637	6550	8498	8498	6353	6618	8541	10009·3	7801·1	5693	6265·9	4665	5013	3129	2146	2517·5	2328	1049·5	1049·5	1448	817·0	2034·5	1126	1126
Length — Chamber . . .	1397	1397	1609	1609	1209	1373·1	1299·6	1508·4	1123	787·7	1049·9	474	742	560·5	265	265	229	205	262	262	175	2574	208	133·4
Length — Bore, in calibres .	32	32	40·5	40·5	32·4	33·5	41	48	42·5	42·5	48	43	48	49	·12	49	·15	22	23	30	22	49	34	34
Number of Grooves . . .	42	A. 42	B. 40	44	44	42	40	40	40	60	44	44	36	36	28	24	24	24	24	24	24	20	16	16
Twist of Rifling . . .	40	40	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	25	25	27	25	30	30	30
Total Weight . . . tons	30·25	31·03	28·16	29·2	23·84	28·1	25	30·44	19.49	5·92	7·75	2·8	3·7	0·975	0·340	0·380	0·334	{0·216 / 0·206}	0·212	0·189	0·116	0·243	0·0675	0·0751
Weight — Armour-piercing Shell in kg.	204	204	204	204	181	215	215	215	125	45·4	45·4	21	21	—	—	—	—	—	—	—	—	—	—	—
Weight — Common Shell . kg.	182	182	182	182	181	215	215	—	125	—	—	21	21	6·5	2·722	2·722	2·722	2·722	2·722	2·722	1·5	1·5	0·8	0·8
Weight of Firing Charge — Armour-piercing Shell in kg.	41–78	41–78	45·2	45·2	34	45·5	43	56	28	9·8	15	4·15	6·75	—	—	—	—	—	—	—	—	—	—	—
Weight of Firing Charge — Common Shell . kg.	82	82	67	67	—	—	—	—	13·75	9·8	15	4·15	6·75	1·7	0·43	0·435	0·34	0·24	0·24	0·35	0·143	0·3	0·08	0·08
Muzzle Velocity . . m.	640	640	720	720	625	615	685	775	750	750	850	740	860	780	660	704	640	485	485	600	468	740	550	550
Muzzle Energy, total m. ton .	4258	4258	5386	5386	3609	4209	5138	6575	3564	1301	1671	586	791	202	60·4	68·7	56·8	32·64	32·64	49·95	16·73	41·80	12·3	12·3
Perforation Krupp Steel, 3000 m.	30·5	30·5	38·8	45·9	35·0	44	52	—	34	22	24·1	—	16·5	—	—	—	—	—	—	—	—	—	—	—

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UNITED STATES NAVAL ORDNANCE.

GUN.	MARK.	Length in Calibres.	Total Length.	Capacity of Chamber in Cubic Inches.	Travel of Projectile in Inches.	Weight of Gun.	Weight of Projectile.	Weight of Charge.	Muzzle Velocity.	Muzzle Energy.	Penetration at Muzzle, Krupp Armour, using Capped Projectile.	At 3000 Yards.		At 6000 Yards.		At 9000 Yards.	
												Remaining Velocity.	Penetration.	Remaining Velocity.	Penetration.	Remaining Velocity.	Penetration.
			inch.			tons.	lbs.	lbs.	ft.-seconds.	ft.-tons.	inch.	ft.-seconds.	inch.	ft.-seconds.	inch.	ft.-seconds.	inch.
3-in. R.F.G.	II., III.	50	154	219	128·3	0·9	13	3·85	2700	658	3·3	1230	1·2	848	0·8	..	..
3-in. S.A.	V., VI.	50	159	219	128·3	1·0	13	3·85	2700	658	3·3	1230	1·2	848	0·8	..	..
4-in. R.F.G.	III., IV., V., VI.	40	164	331	134·5	1·5	33	4·85	2000	915	3·4	1156	1·7	897	1·2	..	..
4-in. R.F.G.	VII.	50	205	652	168·3	2·6	33	5·0	2500	1,430	4·6	1432	2·2	979	1·4	853	1·2
4-in. R.F.G.	VIII.	50	205	652	168·3	2·9	33	12·3	2800	1,794	5·3	1627	2·6	1033	1·5	878	1·2
5-in. R.F.G.	II., III., IV.	40	206	656	167·8	3·1	50	10·0	2300	1,834	5·3	1286	2·6	934	1·7	829	1·4
5-in. B.L.R.	V., VI.	50	256	1,200	215·6	4·6	60	19·2	2700	3,032	6·2	1692	3·5	1102	2·0	928	1·6
5-in. B.L.R.	VI.	50	256	1,200	215·6	4·6	50[1]	20·5	3000[1]	3,122	6·4	1732	3·2	1057	1·7	877	1·4
5-in. R.F.G.	VII.	51	261	1,165	215·6	5·0	50	23·8	3150	3,439	6·8	1835	3·4	1091	1·8	895	1·4
6-in. R.F.G.	II., III.	30	196	1,318	145·4	4·8	105	18·8	1950	2,768	5·3	1305	3·2	1009	2·3	909	2·0
6-in. R.F.G.	IV., VII.	40	256	1,320	205·8	6·0	105	18·8	2150	3,365	6·0	1440	3·6	1058	2·4	934	2·1
6-in. R.F.G.	IX.	45	270	1,320	221·7	7·0	105	18·8	2250	3,685	6·3	1511	3·8	1086	2·5	948	2·1
6-in. B.L.R.	VI.	50	300	2,101	247·5	8·3	105	30·0	2600	4,920	7·6	1770	4·7	1207	2·9	996	2·2
6-in. B.L.R.	VIII.	50	300	2,101	247·5	8·6	105	37·0	2800	5,707	8·3	1923	5·2	1297	3·2	1026	2·3
7-in. B.L.R.	II.	45	323	3,643	259·8	12·7	165	58·0	2700	8,338	9·6	1948	6·4	1382	4·2	1083	3·0
8-in. B.L.R.	III., IV.	35	305	3,170	245·8	13·1	260	43·8	2100	7,948	8·6	1576	6·0	1206	4·2	1040	3·6
8-in. B.L.R.	V.	40	343	5,243	273·1	18·1	260	78·0	2500	11,264	10·6	1898	7·5	1428	5·3	1141	4·0
8-in. B.L.R.	VI.	45	369	5,243	299·1	18·7	260	98·5	2750	13,360	12·0	2106	8·6	1589	6·1	1227	4·4
10-in. B.L.R.	I., II.	30	329	6,779	251·1	25·1	510	90·0	2000	14,141	10·7	1590	8·0	1274	6·1	1103	5·0
10-in. B.L.R.	III.	40	413	10,222	327·0	34·6	510	207·5	2700	25,772	15·6	2184	11·9	1747	9·0	1406	6·9
12-in. B.L.R.	I., II.	35	441	11,991	345·2	45·3	870	160·0	2100	26,596	14·2	1733	11·2	1433	8·8	1219	7·2
12-in. B.L.R.	III., IV.	40	493	17,096	392·2	52·1	870	237·5	2400	34,738	16·8	1994	13·3	1649	10·5	1376	8·3
12-in. B.L.R.	III., IV.	40	493	17,096	392·2	52·1	870	305 0[2]	2600[2]	40,768	18·5	2171	14·8	1801	11·7	1500	9·3
12-in. B.L.R.	V.	45	553	16,974	452·0	52·9	870	305·0	2700	43,964	19·4	2259	15·5	1877	12·3	1561	9·8
12-in. B.L.R.	VI.	45	553	14,970	452·0	53·6	870	340·0[3]	2850[3]	48,984	20·8	2393	16·6	1991	13·3	1653	10·6
12-in. B.L.R.	VII.	50	607	14,296	506·3	56·1	870	340·0[3]	2950[3]	52,483	21·7	2483	17·5	2071	13·9	1719	11·0
13-in. B.L.R.	I., II.	35	479	15,068	374·9	61·4	1130	180·0	2000	31,333	15·0	1679	12·0	1414	9·7	1221	8·1
14-in. B.L.R.	II.	45	642	..	..	63·1	1400	365·0	2600	65,606	28 3*	..	23·4*	..	..	..	..

* Harveyized armour.

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ELSWICK GUNS.

This Table is supplied by the Manufacturers.

												Jointed Gun	Field.	Horse Artillery.	Field.	Howitzer.			Howitzer.	Howitzer.				Field Position.	Howitzer.	Howitzer.				
Diameter of Bore, ins.	1·46	1·46	1·85	1·85	1·85	1·85	2·24	2·24	2·953	3	3	3	3	3	3·3	4	4	4	4·3	4·7	4·7	4·7	4·7	5	5	6	6	6	6	7·5
do. do. mm.	37	37	47	47	47	47	57	57	75	76	76	76	76	76	84	102	102	102	109·2	120	120	120	120	127	127	152	152	152	152	190
Length of Bore, cals.	25	45	40	50	50	46	40	50	14·13	40	50	19·2	28	23	28	8·75	40	50	12·5	12	40	45	50	32	8·4	12·2	40	45	50	45
Weight of Gun	lb. 79	lb. 268	lb. 506	lb. 1067	lb. 852	lb. 560	lb. 840	cwt. 10½	lb. 210	cwt. 12	cwt. 18½	cwt. 4	cwt. 7¼	cwt. 6	cwt. 9	lb. 220	cwt. 26	cwt. 42	cwt. 7	cwt. 8	cwt. 42	cwt. 53	cwt. 66	tons 2	cwt. 9	cwt. 20	tons 6·6	tons 7·35	tons 8·75	tons 13·8
do. Projectile, lbs.	1·1	1·5	3·3	3·3	3·3	3·3	6	6	11·75	12½	12·5	12·5	14·3	12·5	18·5	20	31	31	40	35	45	45	45	60	50	100	100	100	100	200
do. Cordite Charge	oz. 1·125	oz. 4·5	oz. 7·94	lb.oz. 1 4½	...	...	oz. 9·2	...	oz. 7½	lb.oz. 1 10	lb.oz. 3 4	...	...	...	lb.oz. 1 3½	...	...	...	oz. 15·75	...	lb.oz. 5 5	lb.oz. 8 2½	..	lb. 8·5	oz. 11·5	...	lb. 18·3	lb. 26	lb. 36	...
do. M.D. do. ...	...	...	...	1 6	oz. 15·0	oz. 10·0	...	lb.oz. 1 3	...	2 0	4 0	oz. 13½	oz. 20½	lb.oz. 1 4	1 8	oz. 9½	lb. 5½	lb. 11	...	lb.oz. 1 4½	...	9 4	lb.oz. 15 0	lb.oz. 9 8	...	lb.oz. 3 5	22	31	34	lb. 75
Muzzle Velocity, f.s.	1540	2300	2132	2800	2700	2300	1968	2400	1100	2210	2800	1458	1755	1700	1635	950	2300	3000	980	1150	2200	2570	3000	2115	782	1000	2500	2800	2930	2850
Muzzle Energy, f.t.	18	55	104	179	166	121	161	240	98	423	680	185	305	250	336	125	1137	1934	266	321	1510	2061	2808	1861	212	693	4334	5436	5952	11264
Penetration at Muzzle, ins.	1·9	4·3	5·2	7·8	7·4	5·7	5·6	8·0	...	8·8	11·6	...	...	...	...	...	...	16·0	...	...	11·6	15·2	19·4	13·0	...	...	19·5	23·1	24·8	30·4
Rounds per Minute ...	...	25	25	25	25	25	25	25	20	20	20	15	15	20	20	...	12	12	...	...	12	12	12	10	...	...	9	9	9	6

Diameter of Bore, ins.	7·5	8	8	8·24	9·2	9·2	10	10	10	12	12	12	12
do. do. mm.	190	203	203	210	234	234	254	254	254	305	305	305	305
Length of Bore, cals.	50	45	50	44	45	50	40	45	50	40	40	45	50
Weight of Gun	tons 15	tons 18·0	tons 21	tons 18·1	tons 26·75	tons 28	tons 31	tons 36·25	tons 36	tons 48·5	tons 51	tons 59·3	tons 69·0
do. Projectile, lbs.	200	250	250	308·6	380	380	450	500	500	850	850	850	850
do. Cordite Charge	...	...	...	lb. 47	...	...	lb. 81·5	...	...	lb. 141	...	...	...
do. M.D. do. ...	lb. 77·5	lb. 80	lb. 85	lb. 52	lb. 122	lb. 136	86·5	lb. 167	lb. 180	155	lb. 260	lb. 286	lb. 318
Muzzle Velocity, f.s.	2950	2800	2950	2300	2750	3000	2400	2800	2900	2400	2650	2800	2960
Muzzle Energy, f.t.	12068	10872	12069	11320	19926	23712	17973	27181	29157	33949	41386	46208	51640
Penetration of Muzzle, ins.	32·0	32·2	34·8	27·0	35·9	39·8	29·9	40·9	42·95	38·4	44·6	48·5	52·5
Rounds per Minute ...	6	5	5	5	4	4	3	3	3	2	2	2	2

SOME RESULTS ACTUALLY OBTAINED UNDER SERVICE CONDITIONS AT A TARGET.

12-in. gun—8 rounds in 2 minutes 10 seconds from 1 turret (pair of guns); 16 rounds in 2 minutes 45 seconds from two turrets (four guns).

9·2-in. gun—57 rounds in 2 minutes from six guns; 44 rounds in 2 minutes from six guns; 13 rounds in 2 minutes from two guns.

7·5-in. gun—38 rounds in 1 minute 45 seconds from four guns; 35 rounds in 1 minute 45 seconds from four guns.

6-in. gun—74 rounds in 1 minute from 10 guns; 78 rounds in 1 minute from ten guns.

4·7-in. gun—79 rounds in 1 minute from eight guns.

4-in. gun—59 rounds in 45 seconds from eight guns.

12 pr. gun—10 rounds in 31 seconds from one gun.

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VICKERS, SONS & MAXIM'S GUNS AND MOUNTINGS.

This Table is supplied by the Manufacturers.

		37 mm. 30 cal.	37 mm. 42·5 cal.	3-pdr. 50 cal.	6-pdr. 50 cal.	Mountain. 3-in.–12-pr. 14·3 cal	Field. Light. 3-in. 22 cal.	Field. Heavy. 2·95-in. 30 cal.	3-in. Semi-Aut. 50 cal.	4-in. 50 cal.	4·33-in. Howitzer. 13·5 cal.	4·7-in. 45 cal.	4·7-in. 48·4 cal.	6-in. Howitzer.	6-in. 45 cal.	6-in. 50 cal.	7·5-in. 45 cal.	7·5-in. 50 cal.	8-in. 48·5 cal.	9·2-in. 47 cal.	9·2-in. 50 cal.	10-in. 45 cal.	10-in. 48·6 cal.	12-in. 45 cal.	12-in. 50 cal.
Gun.	Diameter of Bore .ins.	1·457	1·457	1·85	2·244	3	3	2·95	3	4	4·33	4·724	4·724	6	6	6	7·5	7·5	8	9·2	9·2	10	10	12	12
	Length of Bore . .ins.	43·5	62	92·5	112·2	42·94	64·96	99·46	150	201·15	58·45	212·6	228·45	94·5	269·5	300	337·5	375	388·75	429·3	460	450	486	540	600
	Length of Gun . .ins.	73·75	94	98·9	118·6	47·23	69·3	103·8	156·995	208·45	63·55	220	236·2	102·8	279·2	310·07	349·2	386·7	400	442·35	473	464·6	500	557·55	617·7
	Maximum pressure in Chamber, tons per sq.in.	13	14	17	16	12	16	16·0	17	18	12·5	17	18	9·85	17·75	18	18	17·5	18	18	18	18	18	18	18·5
	Weight of Charge lbs.	·0782	·1875	1·066	1·55	·5	1	1·032	3·625	11·25	1·0	19	17	5·3	35·25	43	78·25	80·03	90	170·5	184	190·5	172	356	344
	Weight of Projectile lbs.	1	1·25	3·3	6	12·5	12·5	14·33	12·5	31	35·27	45	45·14	90·3	100	100	200	200	216·7	380	380	478·4	496·6	850	850
	Weight of Gun . . .	c. q. l. 3 2 24	c. q. l. 5 1 19	c. q. l. 5 2 4	c. q. l. 9 1 5	c. q. l. 2 1 23	c. q. l. 4 2 0	c. q. l. 7 2 6	c. q. l. 19 0 0	t. c. q. 2 1 3	c. q. 7 1	t. c. q. 3 3 3	t. c. q. 3 2 0	c. q. 18 3	t. c. q. 7 8 27	t. c. q. 7 16 0	t. c. q. 14 0 2	t. c. q. 16 0 0	t. c. q. 14 3 0	t. c. q. 28 1 0	t. c. q. 27 16 1	t. c. q. 34 17 0	t. c. q. 27 17 0	t. c. q. 57 14 0	t. c. q. 65 17 0
	Muzzle Velocity . .f.s.	1800	2300	2800	2600	1150	1600	1660	2700	3030	1045	2925	3050	1285	3012	3190	2875	3007	3090	3025	3070	2850	2863	2950	3010
	Muzzle Energy . .f.t.	22·5	45·85	179·4	281	115	220	274	632	1975	267	2670	2910	1035	6290	7056	11465	12540	14350	24110	24835	26945	28225	51290	53400
	Penetration of Wrought Iron Plate at Muzzle. Gavre formula . .ins.	1·9	3·3	6·7	7·5	..	..	..	9·65	16·0	..	16·65	17·8	..	23·65	25·8	28·75	30·75	31·5	39·25	39·95	38·9	40·2	50·65	52·1
	Penetration of Mild Steel Plate at Muzzle. Gavre formula . . . .ins.	1·5	2·6	5·1	5·4	..	..	..	7·5	12·4	..	12·9	13·8	..	18·4	20	22·25	23·7	24·4	30·45	31·0	30·1	31·15	39·25	40·4
	Penetration of Hard Steel Plate at 3000 yards. Gavre formula . .ins.	..	..	..	..	..	..	..	..	..	..	..	4·5	..	6·3	7·2	8·9	9·35	9·8	13·35	13·75	13·8	14·65	19·5	20·0
	Rounds per minute . .	300	300	30	28	20	25	20	25	15	..	12	12	..	10	10	8	8	6	4	4	3	3	2	2
Mounting.							Weight of carriage without limber.	Wht. of car. and limber with 24 rounds.			Weight of carriage without limber.			Weight of carriage without limber.											
	Weight of Mounting complete with Shield . .	c. q. l. 4 1 10	c. q. l. 4 3 20	c. q. l. 11 3 0	c. q. l. 14 2 0	c. q. l. 7 3 0	c. q. l. 11 3 0	t. c. q. l. 1 5 1	t. c. q. l. 1 0 2 0	t. c. q. l. 2 4 2 0	c. q. l. 17 3 0	t. c. q. l. 3 13 3 0	t. c. q. l. 5 9 2 0	t. c. q. l. 2 14 3 0	Depending on type of Mounting used.										
	Thickness of Shield .ins.	·1875	·16	·25	no	·1	·125	·144	no	no	no	2 & ·313	3	·23											
	Weight of Shield . . .	q. l. 3 11	q. l. 1 22	c. q. l. 1 0 0	shield	q. l. 1 17	q. l. 2 0	c. q. l. 1 0 15	shield	shield	shield	c. q. l. (17 0 0) (1 1 0)	t. c. q. l. 1 12 2 0	c. q. 3 3											
	Angle of Elevation . .	16°	15°	20°	20°	25°	16°	16°	20°	15°	50°	20°	20°	50°											
	Angle of Depression . .	25°	20°	20°	10°	15°	6°	10°	10°	10°	5°	7°	10°	0°											

Corrected to February, 1910.

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SCHNEIDER GUNS.

The information in this Table is given by the Manufacturers.

Calibre, in millimètres.	305		274·4		240		210		200		175		150		120		100		75		65		57		47	37
Calibre, in inches	12·0	12·0	10·9	10·9	9·4	9·4	8·3	8·3	7·9	7·9	6·9	6·9	5·9	5·9	4·7	4·7	3·9	3·9	2·9	2·9	2·5	2·5	2·21	2·21	1·8	1·4
Length, in calibres	45	50	45	50	45	50	45	50	45	50	45	50	45	50	45	50	45	50	50	60	50	60	50	60	60	60
Weight, in tons	52·9	57·3	38·5	41·7	25·8	27·9	17·3	18·6	14·9	16·2	10·0	10·8	6·3	6·8	3·2	3·5	1·9	2·0	·85	1·2	·55	·76	·45	·55	·30	·17
Weight of A.P. Projectile, lbs.	826	826	606	606	407	407	275	275	231	231	165	165	99	99	48	48	28·6	28·6	14·3	14·3	8·8	8·8	6	6	3·3	1·76
Weight of Charge	Not stated.																									
Muzzle Velocity, ft.-secs.	2952	3116	2952	3116	2952	3116	2952	3116	2952	3116	2952	3116	2952	3116	2952	3116	2952	3116	2871	3035	2952	3116	2952	3116	3116	3116
Muzzle Energy, ft.-tons	50007	55717	36670	40859	24667	27487	16667	18572	14002	15601	10000	11143	6001	6686	2932	3268	1734	1931	820	917	533	594	362	400	223	119
Perforation of Steel at muzzle (ins.)	38·3	41·6	34·6	37·4	30·1	32·3	26·2	28·3	24·3	26·3	22·1	23·9	18·2	20·1	13·9	15·0	11·6	12·5	9·3	10·0	7·9	9·1	7·1	7·5	5·9	5·0
Perforation of Steel at 3000 yards (ins.)	29·3	31·9	25·5	27·8	21·2	23·1	17·5	19·2	16·1	17·3	13·8	15·2	10·2	11·8	6·4	6·9	4·6	4·9	..	..	..	..	..	..	..	..

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KRUPP GUNS.

Tables supplied by Manufacturers.

NAVAL GUNS.

Calibre, in centimètres	7·5			10·5			12			15			21			24			28			30·5		
Calibre, in inches	2·95			4·13			4·72			5·91			8·27			9·45			11·02			12·01		
Total Length of Gun, in cals.	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50
Total Length, in feet	9·84	11·07	12·30	13·78	15·5	17·22	15·75	17·7	19·69	19·55	22·00	24·44	27·56	30·9	34·45	31·50	35·4	39·37	36·75	41·3	45·93	40·03	45·0	50·03
Length of Bore, in inches	108·66	123·43	138·19	153·55	174·21	194·89	175·20	199·25	222·45	218·12	247·49	276·78	305·91	347·29	388·59	350·80	398·28	445·28	409·46	464·62	519·70	445·67	505·95	565·76
Weight of Gun, in lbs.	1488	1711	1936	3748	4189	4740	5512	6283	7055	10582	12015	13558	29321	33279	37258	44092	50265	56438	70105	79807	89507	90609	103174	120141
Weight of Gun, in tons	0·66	0·76	0·86	1·67	1·86	2·11	2·45	2·79	3·14	4·70	5·34	6·03	13·03	14·80	16·56	19·60	22·34	25·09	31·16	35·48	39·79	40·28	45·86	51·45
Weight of Steel Projectile, in lbs.	11·5	11·5	11·5	30·86	30·86	30·86	46·30	46·30	46·30	90·39	90·39	90·39	249·1	249·1	249·1	374·8	374·8	374·8	595·2	595·2	595·2	771·6	771·6	771·6
	14·6	14·6	14·6	39·68	39·68	39·68	59·52	59·52	59·52	112·4	112·4	112·4	308·6	308·6	308·6	474·0	474·0	474·0	760·6	760·6	760·6	981·0	981·0	981·0
Weight of Charge, in lbs.	2·77	3·12	3·54	10·47	12·57	14·33	15·66	17·97	20·62	29·99	34·40	39·47	82·47	94·59	108·71	124·58	143·10	164·27	198·41	227·07	262·35	255·73	293·21	337·30
Muzzle Velocity, in ft.-secs.	2690	2890	3068	2835	3022	3199	2877	3038	3225	2854	3008	3196	2851	3015	3196	2854	3018	3199	2854	3018	3202	2854	3018	3199
	2388	2566	2723	2500	2661	2822	2539	2677	2841	2556	2697	2858	2559	2707	2868	2533	2687	2845	2523	2664	2835	2526	2674	2838
Muzzle Energy, total ft.-tons	576	665	749	1720	1952	2191	2659	2969	3340	5099	5680	6389	14037	15684	17620	21169	23718	26655	33561	37595	42435	43564	48728	54859
Perforation through Steel, in ins.	7·13	7·91	8·58	10·87	11·92	12·93	12·87	13·90	15·15	16·15	17·41	18·98	23·20	25·13	27·30	26·96	29·20	31·73	31·80	34·45	37·48	34·94	37·84	41·10
Perforation through Iron, Tresidder's formula	9·9	11·0	11·7	14·7	17·24	18·77	18·35	19·91	21·77	22·66	24·52	26·84	31·73	34·51	37·65	36·47	39·66	43·27	42·52	46·28	50·57	46·42	50·47	55·08
Perforation Krupp Steel, 3000 yards	..	..	..	..	..	..	3·52	3·74	4·02	4·98	5·29	5·66	8·14	8·65	9·22	9·84	10·45	11·13	12·11	12·86	13·70	13·58	14·41	15·33

COAST GUNS.

Calibre, in centimètres	7·5			10·5			12			15			21			24			28			30·5		
Calibre, in inches	2·95			4·13			4·72			5·91			8·27			9·45			11·02			12·01		
Total Length of Gun, in cals.	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50
Total Length, in feet	9·84	11·07	12·30	13·78	15·5	17·22	15·75	17·7	19·69	19·55	22·00	24·44	27·56	30·9	34·45	31·50	35·4	39·37	36·75	41·3	45·93	40·03	45·0	50·03
Length of Bore, in inches	108·66	123·43	138·19	153·55	174·21	194·89	175·20	199·25	222·45	218·12	247·49	276·78	305·91	347·29	388·59	350·80	398·28	445·28	409·46	464·62	519·70	445·67	505·95	565·76
Weight of Gun, in lbs.	1861	2094	2326	4519	5115	5688	6724	7606	8188	12897	14661	16314	35715	40344	44974	53792	60847	67902	85538	96782	108025	110671	125001	139772
Weight of Gun, in tons	0·83	0·93	1·03	2·01	2·27	2·53	2·99	3·38	3·77	5·73	6·52	7·25	15·88	17·93	19·99	23·92	27·05	30·18	38·02	43·02	48·02	49·20	55·57	62·13
Weight of Steel Projectile, in lbs.	11·5	11·5	11·5	30·86	30·86	30·86	46·30	46·30	46·30	90·39	90·39	90·39	249·1	249·1	249·1	374·8	374·8	374·8	595·2	595·2	595·2	771·6	771·6	771·6
	14·6	14·6	14·6	39·68	39·68	39·68	59·52	59·52	59·52	112·4	112·4	112·4	308·6	308·6	308·6	474·0	474·0	474·0	760·6	760·6	760·6	981·0	981·0	981·0
Weight of Charge, in lbs.	2·99	3·35	3·76	11·80	13·45	15·32	17·53	19·96	22·93	33·52	38·15	43·88	92·59	105·40	120·83	140·02	159·42	182·57	222·67	253·53	291·00	286·60	326·28	374·78
Muzzle Velocity, in ft.-secs.	2876	2999	3123	2930	3107	3281	2920	3097	3268	2882	3068	3242	2887	3068	3245	2897	3074	3248	2897	3074	3251	2894	3068	3248
	2664	2775	2885	2582	2740	2894	2572	2733	2887	2589	2753	2900	2592	2756	2913	2576	2733	2887	2562	2720	2871	2562	2720	2877
Muzzle Energy, total ft.-tons	620	703	795	1836	2065	2307	2736	3082	3429	5228	5905	6583	14425	16232	18168	21815	24557	27430	34690	39047	43564	44855	50341	56473
Perforation through Steel, in ins.	7·52	8·23	8·98	11·40	12·40	13·40	13·15	14·29	15·43	16·42	17·91	19·37	23·62	25·76	27·91	27·54	29·98	32·43	32·48	35·37	38·31	35·63	38·71	42·01
Perforation through Iron, Tresidder's formula	10·5	11·3	12·0	16·46	17·97	19·50	18·76	20·49	22·21	23·05	25·24	27·42	32·34	35·42	38·53	37·29	40·76	44·27	43·51	47·56	51·73	47·39	51·72	56·35
Perforation Krupp Steel, 3000 yards	..	..	..	..	..	..	3·55	3·83	4·08	5·05	5·40	5·76	8·25	8·81	9·37	10·00	10·66	11·32	12·30	13·11	13·92	13·78	14·66	15·60

There are other and later types of Krupp guns, of which particulars have not been obtained.

BETHLEHEM STEEL CO.

ORDNANCE.

This Table is supplied by the Manufacturers.

Calibre.	Length of bore in Calibres.	Calibre.	Weight of Gun.	Weight of Projectile.	At Muzzle.		Perforation of Wrought Iron. (Gavre Formulæ.)	At 3000 yards Range.			At 8000 yards Range.			Limiting ranges beyond which capped armour piercing projectiles will not perforate Krupp hard-faced armour of 12 inches and 7 inches thickness.		Calibre.
					Velocity.	Energy.		Dangerous Space for Target 25 feet high.	Energy.	Perforation of Bethlehem hard-faced armour by capped armour piercing projectiles, with normal impact.	Dangerous Space for Target 25 feet high.	Energy.	Perforation of Bethlehem hard-faced armour by capped armour piercing projectiles, with normal impact.	12-in. plate.	17-in. plate.	
inches.	calibres.	cms.	lbs.	lbs.	ft. per sec.	foot-tons.	inches.	yards.	foot-tons.	inches.	yards.	foot-tons.	inches.	yards	yards.	inches.
1·457	50	3·7	120	1	2150	37	..	..	..	..	..	..	..	..	..	1·457
1·851	50	4·7	550	3	2400	119	..	..	..	..	..	..	..	..	..	1·851
2·244	50	5·7	960	6	2400	240	..	..	..	..	..	..	..	..	..	2·244
3	50	7·62	1900 tons.	13	2800	707	..	..	..	..	..	..	..	..	..	3
4	45	10·16	2·3	33	2600	1,545	9·8	240	755	..	..	..	..	..	..	4
4	50	10·16	2·6	33	3000	2,060	12·1	315	1,000	..	..	..	..	..	..	4
5	45	12·7	3·4	60	2600	2,810	12·8	255	1,575	..	..	..	..	..	..	5
5	50	12·7	4·75	60	3000	3,745	15·8	340	2,035	..	..	..	..	..	..	5
6	45	15·24	7·2	105	2600	4,965	16·9	275	2,970	6·9	55	1,307	4·1	..	2,870	6
6	50	15·24	8·4	105	3000	6,550	20·6	365	3,950	8·3	75	1,749	4·9	..	4,500	6
7	45	17·78	12·7	165	2800	8,965	23·2	330	5,790	9·5	70	2,285	6·1	..	6,350	7
7	50	17·78	14·5	165	3000	10,300	25·5	385	6,640	10·4	85	3,267	6·7	..	7,310	7
8	35	20·32	15·2	316	2250	10,500	28·3	235	8,240	11·0	60	5,060	8·1	..	10,230	8
8	45	20·32	18·6	260	2800	14,230	29·1	350	9,860	12·3	85	5,457	8·6	3,240	10,420	8
8	50	20·32	22·3	260	3000	16,220	32·2	405	11,350	13·4	95	6,235	9·0	4,420	11,610	8
10	35	25·4	30·0	604	2250	21,200	38·6	245	16,580	14·8	65	11,120	11·5	7,300	Max. range	10
10	45	25·4	35·4	515	2800	27,990	40·8	370	21,080	17·2	95	13,160	12·8	9,075	Max. range	10
10	50	25·4	43·9	515	3000	32,110	44·7	430	24,070	18·7	115	15,150	13·9	10,560	Max. range	10
12	35	30·48	52·0	1046	2250	36,700	50·1	250	29,880	19·1	70	21,700	15·6	14,180	Max. range	12
12	45	30·48	53·8	870	2800	47,290	51·7	380	36,790	21·7	105	24,615	16·9	14,560	Max. range	12
12	50	30·48	66	870	3000	54,280	57·1	435	42,350	23·7	120	28,135	18·3	16,330	Max. range	12
14	35	35·56	57·4	1660	2150	53,190	50·4	230	44,660	22·3	70	33,650	18·7	Max. range	Max. range	14
14	45	35·56	70·3	1350	2450	56.170	52·4	295	45,090	22·4	85	32,030	18·1	Max. range	Max. range	14
18	30	45·72	60·0	2075	2150	66,490	49·2	225	52,750	21·1	65	36,360	16·7	15,100	Max. range	18

Guns less than 3-inch calibre are chambered for fixed ammunition with the powder and projectiles in brass cartridge cases. Guns from 3-inches calibre upwards, and including the 6-inch L45 gun, can be chambered to use either fixed ammunition, or chambered to use loose ammunition with the powder in cartridge bags and the projectile separate from the powder. Guns above 6-inches calibre and including the 6-inch L45 gun are chambered for loose ammunition. The breech mechanisms of all guns up to 10-inches are operated by the single motion of a hand-lever. Those of the larger guns are operated by the revolution (3 to 5 turns) of a crank.

The 8-inch, 10-inch, and 12-inch L50-guns, and the 14-inch L45 gun are for use in turrets, and are of great weight at the breech in order to balance the long muzzles, so that a comparatively small barbette may be used.

Corrected to February, 1910.

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Table Relating to Conversion of Measures.

Length.

Metric to English. | English to Metric.

I. Mètres.	II. Yards.	III. Feet.	IV. Inches.	V. Yards.	VI. Mètres.	VII. Feet.	VIII. Mètres.	IX. Inches.	X. Centimètres.
1	1·0936	3·2809	39·37	1	0·91438	1	0·30479	1	2·5400
2	2·1873	6·5618	78·74	2	1·82877	2	0·60959	2	5·0799
3	3·2809	9·8427	118·11	3	2·74315	3	0·91438	3	7·6199
4	4·3745	13·1236	157·48	4	3·65753	4	1·21918	4	10·1598
5	5·4682	16·4045	196·85	5	4·57192	5	1·52397	5	12·6998
6	6·5618	19·6854	236·22	6	5·48630	6	1·82877	6	15·2397
7	7·6554	22·9663	275·60	7	6·40068	7	2·13356	7	17·7797
8	8·7491	26·2472	314·97	8	7·31507	8	2·43836	8	20·3196
9	9·8427	29·5281	354·34	9	8·22945	9	2·74315	9	22·8596

Explanation.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of yards in 2354 mètres (see cols. I. & II.).	of feet in 12·4 mètres (see cols. I. & III.).	of inches in 30·5 centimètres (see cols. I. & IV.). Note, 1 m.=100 cm.	of mètres in 1026 yards (see cols. V. & VI.).	of mètres in 1742 feet (see cols. VII. & VIII.).	of centimètres in 17·72 ins. (see cols. IX. & X.)
mètres. yards.	mètres. feet.	cms. inches.	yards. mètres.	feet. mètres.	inches. cms.
2000=2187·3	10 =32·809	30·0=11·811	1000=914·38	1000=304·79	10·0 =25·400
300= 328·09	2 = 6·562	·5= ·197	20= 18·29	700=213·36	7·0 =17·780
50= 54·68	0·4= 1·312		6= 5·49	40= 12·19	0·7 = 1·778
4= 4·37				2= 0·61	·02= ·051
∴ 2354=2574·44	∴ 12·4=40·683	∴ 30·5=12·008	∴ 1026=938·16	∴ 1742=530·95	∴ 17·72=45·009

Note.—A ready way of approximately converting all French measures into English inches is to multiply by 4 and apply the decimal point by common sense—Thus for a 15-cm. gun; $15 \times 4 = 60$. Now this Calibre cannot be 60 inches, nor can it be 0·6 inch; therefore it must be 6 inches. (The exact value is 5·906 in.)

Weight.

Metric to English. | English to Metric.

I. Kilogrammes	II. Tons.	III. Pounds Avoirdupois.	IV. Grains Troy.	V. Tons.	VI. Milliers.	VII. Pounds Avoirdupois.	VIII. Kilogrammes.	IX. Grains. Troy.	X. Gramme
1	·000984	2·2046	15432·3	1	1·016	1	0·4536	1	·0648
2	·001968	4·4092	30864·7	2	2·032	2	0·9072	2	·1296
3	·002953	6·6139	46297·0	3	3·048	3	1·3608	3	·1944
4	·003937	8·8185	61729·4	4	4·064	4	1·8144	4	·2592
5	·004921	11·0231	77161·7	5	5·080	5	2·2680	5	·3240
6	·005905	13·2277	92594·1	6	6·096	6	2·7216	6	·3888
7	·006889	15·4323	108026·4	7	7·112	7	3·1751	7	·4536
8	·007874	17·6370	123458·8	8	8·128	8	3·6287	8	·5184
9	·008858	19·8416	138891·1	9	9·144	9	4·0823	9	·5832

Explanation.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of tons in 35 milliers (see cols. I. & II. Note, 1000 kg. =1 millier).	of pounds in 56·3 kilogrammes. (see cols. I. & III.).	of grains in 120 grammes (see cols. I. & IV. Note, 1000 grms. = 1 kg.)	of milliers in 38 tons (see cols. V. & VI.).	of kilogrammes in 68 pounds (see cols. VII. & VIII).	of grammes in 85 grains (see cols. IX. & X.).
milliers. tons.	kgrms. lbs.	grammes. grains.	tons. milliers.	lbs. kgs.	grains. grammes.
30 = 29·53	50 =110·231	100=1543·23	30 = 30·48	60 = 27·216	80 = 5·184
5 = 4·92	6 = 13·228	20= 308·65	8 = 8·13	8 = 3·629	5 = 0·324
	0·3= ·661				
∴ 35 = 34·45	∴ 56·3=124·120	∴ 120=1851·88	∴ 38 = 38·61	∴ 68 = 30·845	∴ 85 = 5·508

Note.—7000 grains troy = 1 pound avoirdupois.

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PRESSURE.

Metric to English.			English to Metric.				Atmospheric to English.		English to Atmospheric.	
I. Kilogrammes per square centimètre.	II. Pounds per square inch.	III. Tons per square inch.	IV. Pounds per square inch.	V. Kilogrammes per square centimètre.	VI. Tons per square inch.	VII. Kilogrammes per square centimètre.	VIII. Atmospheres.	IX. Tons per square inch.	X. Tons per square inch.	XI. Atmospheres.
1	14·223	·00635	1	·07031	1	157·49	1	·00656	1	152·38
2	28·446	·01279	2	·14062	2	314·99	2	·01313	2	304·76
3	42·668	·01905	3	·21003	3	472·48	3	·01969	3	457·14
4	56·891	·02540	4	·28124	4	629·97	4	·02625	4	609·52
5	71·114	·03175	5	·35155	5	787·47	5	·03281	5	761·91
6	85·337	·03810	6	·42186	6	944·96	6	·03938	6	914·29
7	99·560	·04445	7	·49217	7	1102·45	7	·04594	7	1066·67
8	113·783	·05080	8	·56248	8	1259·95	8	·05250	8	1219·05
9	128·005	·05715	9	·63279	9	1417·44	9	·05906	9	1371·43

Note.—One atmosphere is taken to be 14·7 lbs. per square inch.

Explanation.—To convert any number from one measure to the other, take the value of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of pounds per square inch in 32·1 kilogrammes per square centimètre (see cols. I. & II.).		of tons per square inch in 3210 kilogrammes per square centimètre (see cols. I. & III.).		of kilogrammes per square centimètre in 15 lbs. per square inch (see cols. IV. & V.).		of kilogrammes per square centimètre in 18 3 tons per square inch (see cols. VI. & VII.).		of tons per square inch in 3254 atmospheres. (see cols. VIII. & IX.).		of atmosphere in 14·6 tons per square inch (see cols. X. & XI.).	
kgs. per sq. cm.	lbs per sq. in.	kgs. per sq. cm.	tons per sq. in.	lbs. per sq. in.	kgs. per sq. cm.	tons per sq. in.	kgs. per sq. cm.	atmospheres.	tons per sq. inch.	tons per sq. in.	atmospheres.
30 =	426·68	3000 =	19 05	10 =	·7031	10 =	1574·9	3000 =	19·69	10 =	1523·8
2 =	28·45	200 =	1·27	5 =	·3516	8 =	1259·95	200 =	1·31	4 =	609·5
0·1 =	1·42	10 =	·06			0·3 =	47·25	50 =	·33	0·6 =	91·4
∴ 32·1 =	456·55	∴ 3210 =	20·38	∴ 15 =	1·0547	∴ 18·3 =	2882·10	4 =	·03	∴ 14·6 =	2224·7
								∴ 3254 =	21·36		

ENERGY.

Metric to English.		English to Metric.	
I. Mètre-tons.	II. Foot-tons.	III. Foot-tons.	IV. Mètre-tons.
1	3·2291	1	0·3097
2	6·4581	2	0·6194
3	9·6872	3	0·9291
4	12·9162	4	1·2388
5	16·1453	5	1·5484
6	19·3743	6	1·8581
7	22·6034	7	2·1678
8	25·8324	8	2·4775
9	29·0615	9	2·7872

1 mètre-ton is termed a "dinamode" in Italy.

Explanation.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus find the number

of foot-tons in 4367 mètre-tons (see cols. I. & II.).		of mètre-tons in 3592 foot-tons (see cols. III. & IV.).	
mètre-tons.	foot-tons.	foot-tons.	mètre-tons.
4000 =	12916·2	3000 =	929·1
300 =	968·72	500 =	154·84
60 =	193·74	90 =	27·87
7 =	22·60	2 =	·62
∴ 4367 =	14101·26	∴ 3592 =	1112·43

PERFORATION THROUGH IRON AND STEEL WITH THE FACE NOT HARDENED.

To obtain perforation through steel equivalent to a given perforation through iron, and *vice versa*.

1 inch steel = 1¼ inches iron;

that is, 4 inches steel = 5 inches iron.

Thus, given 9·4 inches perforation through iron,

$$9{\cdot}4 \times \frac{4}{5} = 7{\cdot}52 \text{ inches steel};$$

or, given 5·2 inches steel,

$$5{\cdot}2 \times \frac{5}{4} = 6{\cdot}5 \text{ inches iron.}$$

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PART IV.

STATISTICS, OFFICIAL STATEMENTS AND PAPERS.

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STATEMENT showing the NET EXPENDITURE from NAVY VOTES and LOANS on account of NAVAL SERVICES for the Years 1901–2 to 1908–9, together with the ESTIMATES for 1909–10 and 1910–11.

Year.	Total Expenditure from Navy Votes (Net).	Annuity in Repayment of Loans under the Naval Works Acts.	Total Expenditure exclusive of Annuity [Column (2) deducted from Column (1).]	Expenditure from Loans under Naval Works Acts.	Total of Columns (3) and (4).	Expenditure on New Construction (Vote 8).
	(1)	(2)	(3)	(4)	(5)	(6)
	£	£	£	£	£	£
1901–2	30,981,315	122,255	30,859,060	2,745,176	33,604,236	8,865,080
1902–3	31,003,977	297,895	30,706,082	3,198,017	33,904,099	8,534,917
1903–4	35,709,477	502,010	35,207,467	3,261,083	38,468,550	11,115,733
1904–5	36,859,681	634,238	36,225,443	3,402,575	39,628,018	11,263,019
1905–6	33,151,841	1,015,812	32,136,029	3,313,604	35,449,633	9,688,044
1906–7	31,472,087	1,094,309	30,377,778	2,431,201	32,808,979	8,861,897
1907–8	31,251,156	1,214,403	30,036,753	1,083,663	31,120,416	7,832,589
1908–9	32,181,309	1,264,033	30,917,276	948,262	31,865,538	7,406,930
1909–10 (estimated) . . .	35,142,700	1,330,356	33.812,344	—	33,812,344	8,885,194
1910–11 (estimated) . . .	40,603,700	1,322,752	39,280,948	—	39,280,948	13,279,830

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First Lord's Statement explanatory of Navy Estimates, 1910–11.

THE Estimates for 1910–11 amount to £40,603,700, as compared with £35,142,700 for the current year.

The principal increases occur under the heads of Pay of *Personnel* (Vote I.), Clothing and Victualling (Vote II.), Ordnance (Vote IX.), and the three sections of Shipbuilding (Vote VIII.).

The numbers required for manning the Fleet are 3000 more than were asked for in the Estimates for the current year. This increase is due in part to a revision of the scheme of complement of ships of war, in order to fit them for the needs of modern warfare, and in part to the requirements of new ships now being placed in commission and under construction.

The increase of £120,000 in Vote I. and of £83,500 in Vote II. is due entirely to the pay, food, and clothing required for the additional *personnel*.

The shipbuilding and armament votes (Votes VIII. and IX.) together show a very large increase of over five millions, caused almost entirely by the increase in the shipbuilding programme approved by Parliament last year. In Vote IX. there is also a fresh charge owing to the beginning of the manufacture of torpedoes at the new factory at Greenock.

Vote X. (Works), the other large vote, shows a small increase this year, but would have shown a reduction had it not been for the large surplus of £177,000 which has accrued during the current financial year. The contractors for large works undertakings failed to earn the money under their contracts as rapidly as was expected. The charge for continuing the large new works at Rosyth and Portsmouth, begun last year, is a heavy item in this vote. There are no new works of great magnitude proposed for the coming year, but provision has been made for a new graving dock at Portsmouth, and for such undertakings as the dredging of a berth for the floating dock at Portsmouth for which orders have been placed, and the purchase of a new suction dredger, which is indispensable for this work.

The annuity in repayment of loans under Naval Works Acts, which has shown a steady increase in the Estimates of the last ten years, has, I am glad to say, fallen this year by £7600. The balance of the funds placed at the disposal of the Admiralty by these Acts was expended before the end of 1908–9, and the final account has been presented.

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The expansion of the Fleet naturally increases the miscellaneous charges, such as Travelling, etc., falling upon Vote XI., of which the total has risen by £20,200.

The increases under Votes XII., XIII., XIV., and XV. are automatic, the non-effective charge alone being increased by £114,000.

Shipbuilding.

New construction for the year will cost £13,279,830, as against £8,885,194 for 1909–10. Of this amount £11,850,790 will be spent on the continuation of work on ships already under construction, and £1,429,040 for beginning work on ships of the new programme, which is composed as follows:—

5 Large Armoured Ships,
5 Protected Cruisers,
20 Destroyers,

and a number of Submarine Boats, estimated to cost a sum of three-quarters of a million pounds in all.

Between April 1st, 1909, and March 31st, 1910, the following ships will have been completed and become available for service:—

5 Battleships (Temeraire, Collingwood, St. Vincent, Superb and Vanguard).
2 Unarmoured Cruisers (Boadicea, Bellona).
9 Destroyers—(Six ocean-going vessels of the Tribal Class, the large experimental ship, Swift, and the two River class vessels purchased from Messrs. Cammell, Laird, and Co.).
6 First Class Torpedo Boats (Coastal Destroyer type).
16 Submarines.

On April 1st, 1910, there will be under construction:—

7 Battleships.
3 Armoured Cruisers.
9 Protected Cruisers.
2 Unarmoured Cruisers.
37 Torpedo Boat Destroyers.
9 Submarines.

Of these, the following are expected to be completed by the end of the financial year 1910–11:—a battleship, an armoured cruiser and an unarmoured cruiser, five protected cruisers, twenty destroyers, and four submarines.

Provision was made in Navy Estimates 1909–10 under the ordnance vote, for work in connection with aerial navigation, and

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important experiments have been carried out by the recently formed Aeronautical Branch. Officers, petty officers, and men are now being trained in aeronautics under the direction of a captain. The design of an experimental airship has been completed, and a ship is now under construction. Satisfactory progress is being made, and it is expected that this ship will be completed and ready for trials in the summer of this year, when a large number of experiments will be made to test the value of this vessel under all practical conditions. This service has now been transferred from the ordnance vote to the shipbuilding vote.

After careful inquiry as to the best means of meeting the docking requirements of the immediate future, two large floating docks, capable of taking any war vessel now building or likely to be designed, have been ordered, and will be completed during 1911. It is intended to station them one at Portsmouth and the other in the Medway.

The firms to whom the provisional orders for the floating docks have been given are Messrs. Cammell, Laird, and Messrs. Swan and Hunter. Preparations for building are being pressed on, as are the arrangements for berthing them when delivered.

As a result of the consideration of the workmen's petitions for the previous year, increased rates of pay from April 1st, 1909, were granted to wood caulkers, ship riggers, ropemakers, and wheelwrights, these and several other concessions of a less important nature involving an annual additional liability of about £2800.

Administration.

In development of the arrangements for preparation for war, the Naval Intelligence Department has been reorganized, a new Department—the Naval Mobilisation Department—being formed, and a permanent body, termed the Navy War Council, has been established at the Admiralty. The Council consists of the First Sea Lord as President, the Director of Naval Intelligence, the Director of Naval Mobilisation, and the Assistant Secretary of the Admiralty, the latter acting also as Secretary of the Council. The Head of the Naval War College attends and acts as member of the Council when the business is such as requires his presence, and other responsible officers will be called in to assist and advise when required.

The Naval Mobilisation Department, in addition to other duties, has taken over so much of the work of the Naval Intelligence Department as related to the mobilisation of men and material.

The committee appointed last year to enquire into the Naval Medical Service has submitted a most valuable report, and their recommendations, some of which are of the greatest importance and

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of far-reaching scope, are at present receiving the detailed consideration of the Board of Admiralty. It is hoped that steps will be taken to give effect to many of them at an early date. I should like to take this opportunity of expressing the thanks of the Admiralty to Admiral Sir John Durnford, K.C.B., D.S.O., and his colleagues, and especially to Sir William Watson Cheyne, Bart., C.B., and Mr. G. L. Cheatle, C.B., who gave up so much of their private time to the consideration of the important questions laid before the committee.

A modification has been made in the Hydrographic Department with a view to ensuring that the Department shall be able to command the services of officers with recent experience in the navigation of fleets. The Superintendent of Sailing Directions has therefore been replaced by a new Assistant Hydrographer. In future one of the Assistant Hydrographers will be an officer who has done surveying work at sea, and the other an officer who has had recent experience of the navigation and command of ships in a large fleet.

A committee has been sitting under the presidency of Dr. T. J. Macnamara, M.P., the Financial Secretary, to enquire into the organisation and conditions of service of the writing staff at the dockyards. They have presented a valuable report and their recommendations are now under review. A statement of the conclusions come to will, it is hoped, shortly be published.

Special arrangements have been made to facilitate the transfer of the staff of the torpedo factory at Woolwich and a considerable proportion of the workmen to the new establishment which is being built at Greenock. Negotiations have been entered into with the local municipal authorities for a housing scheme on garden-city lines for their accommodation.

Personnel.

Improvements have been made in the scale of retired pay for officers of the military branch, as a temporary measure, to enable the more senior officers of commander's and lieutenant's rank to retire on better terms than hitherto, and thereby to relieve the congestion on the commanders' and lieutenants' lists. Officers who avail themselves of these exceptional terms of retirement must undertake to place their services at the disposal of the Admiralty if required.

Arrangements for extending the number of naval ratings who are eligible for warrant rank have been completed, and the following classes can now attain the position of warrant officer:—Writers, ship's stewards, ship's police, ship's cooks. Warrant rank has also been introduced for the telegraphist branch, as was indicated two years ago when this class was established.

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In view of the higher educational standards now reached by the men of the Royal Navy, particularly in certain classes, it has been found necessary to make considerable improvements in the pay and prospects of Naval Schoolmasters. Amongst other advantages the proportion of commissioned warrant officers and warrant officers allowed to this branch has been increased, the relative rank of lieutenant will be obtainable by Chief Schoolmasters on retirement, and an improved rate of pay has been established. The scales of pensions for the widows, and of compassionate allowances for the children, of Chief and Head Schoolmasters have also been improved.

The rapid growth of the B Division of the Royal Fleet Reserve, composed of men who have left the active service at the end of their first engagement of 12 years or earlier, has given rise to a large demand for places to be found for its members in civil employment. A three-year agreement has been entered into with the Navy Employment Agency, which undertakes, in consideration of a grant of £1000 per annum, the organisation of special "labour exchange" work on behalf of Fleet Reserve men all over the country.

It is proposed during the coming financial year to give effect as far as may be possible to the policy of substituting the punishment of detention for that of imprisonment for offences against naval discipline which was embodied in the short Act of last Session entitled the Naval Discipline Act, 1909. Seamen and Marines borne on ship's books, sentenced to detention will be regarded as "undergoing detention," and the places in which they will be confined will be termed "detention quarters," the stigma attaching to imprisonment being thus avoided. The system of punishment to be adopted in naval detention quarters will be in harmony with that which has been in force in recent years in military detention barracks.

His Majesty the King has been pleased to approve the grant of a decoration and medal to officers and men of the Royal Naval Reserve and the Royal Naval Volunteer Reserve as a reward for good and long service. The award of the decoration has been made retrospective, and a large number of officers of the Royal Naval Reserve are qualified, and have received the decoration. The Royal Naval Volunteer Reserve being of more recent creation, only officers with previous service in other branches of H.M. Forces will for some years to come have fulfilled the qualifying conditions.

His Majesty the King has been pleased to approve the grant of the Polar Medal and a clasp to the members of Sir Ernest Shackleton's Antarctic expedition, and the presentation of the medals was made by His Majesty in December last.

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The men of the first batch of Australian and New Zealand ratings who were sent to England in the spring of 1907 to be trained for promotion to higher ratings were reviewed by the King on the 26th July, 1909. The majority of the men subsequently returned to Australia in H.M.S. Terrible in August, but a few remained, under special arrangements with the Commonwealth and New Zealand Governments, to complete their course of instruction. Very satisfactory reports were received of them from their commanding officers.

The recommendations of the inter-departmental conference on the Coast-guard have only been partially carried out and, as announced in Parliament, the force is being retained round the coast on the establishment provided for in the Estimates for 1909–10, care being taken to continue assistance where hitherto given at all places where lifeboats and life-saving apparatus have been established. The establishment of the Coast-guard as so fixed is 3100.

Works.

This year has seen the completion of a number of the large engineering works begun under the Naval Works Loan Acts, including the dockyard extension and large dock at Simon's Bay, the Colombo Dock, the dockyard extension and large dock at Hong Kong, the Malta breakwaters, and the enclosure of the Admiralty Harbour at Dover; the latter was formally opened with a public ceremony in October by Admiral His Royal Highness the Prince of Wales, K.G.

In connection with the Portsmouth lock scheme, for which the contract was let in July, 1908, it has now been decided, as I have stated earlier, to build adjacent to the lock a new dock capable of taking vessels of the largest size.

Sea Fisheries.

The general financial recommendations of the inter-departmental conference have not been approved, but the action of the Admiralty as regards the provision of cruisers is being directed on the main lines laid down in the report. The responsibility of the Admiralty is defined as regards the duties devolving upon H.M. ships and the fishery protection vessels maintained by the local authorities.

Maritime Conference.

Since the London declaration was signed an inter-departmental committee, presided over by the Earl of Desart—the King's Proctor—has revised the Naval Prize Manual with a view to its issue to the Fleet when the legislative and other action necessary to give effect

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to the Declaration has been completed. An inter-departmental committee under the presidency of Lord Gorell—late President of the Admiralty Division of the High Court—is now considering the revision of Naval Prize Court procedure, and also the amendments which may be desirable in the Naval Prize Acts.

Imperial Conference.

Certain offers of assistance to meet the charges of the Imperial Navy having been made by the Dominion Governments last spring, a Conference took place in London in August, at which all the self-governing Dominions were represented. The conclusions of the Conference have been published in a Parliamentary Paper—Cd. 4948, November, 1909. Canada and Australia propose to form navies of their own, but New Zealand has decided to give an armoured ship to the Royal Navy as well as to continue its monetary contribution as before. The Australian and New Zealand Governments have passed Acts authorising the construction of two armoured cruisers of the Indefatigable type, tenders for which are now under consideration, and in the case of the Commonwealth three protected cruisers, destroyers and submarines. The Canadian Government has purchased the Rainbow, a second-class cruiser, for use as a training ship, and is negotiating for the purchase of the first-class cruiser Niobe. It is understood that protected cruisers are also to be constructed in Canada.

The Bills of the Imperial Parliament referred to in last year's statement, viz., Colonial Naval Defence Bill, 1909, and the Naval Establishments in British Possessions Bill, 1909, have been passed.

Distribution of the Fleet.

A further stage in the gradual development of the organisation of the Fleet in Home waters, begun in 1905 with the introduction of the Home ports divisions of ships manned with nucleus crews, and extended at the end of 1906 by the creation of the Home Fleet alongside of the already existing Channel and Atlantic Fleets, was reached at the beginning of the present financial year, as announced in my last statement. The Channel Fleet has been absorbed into the Home Fleet, which has now been organised in four main divisions—the first two fully manned, the third manned with nucleus crews, and the fourth with reduced nucleus crews. The programme sketched out in my last statement has been generally adhered to: as new battleships have been completed they have been placed in commission in the First Division of the Home Fleet. Similarly, the new ocean-going destroyers on delivery from the contractors have

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been attached to the First Flotilla, which will shortly contain 12 vessels of this class.

The Home Fleet has carried out a normal routine of cruises and exercises during the past year. The First and Second Divisions have been in company for the greater part of the year, whether in Scottish waters, at Portland, or elsewhere, but they are separated from time to time for convenience of training, and at the present time, with the courteous permission of the Spanish Government, the Second Division (with the Second Cruiser Squadron) is off the coast of Spain in the neighbourhood of Vigo and Arosa Bay. The Atlantic Fleet joined the Home Fleet for exercises in the spring as well as for the summer manœuvres.

The Third or nucleus crew Division of the Home Fleet, comprising three sub-divisions based on the three principal Home Ports, has been assembled and worked as a fleet under the Vice-Admiral Commanding on several occasions. It is at present being so exercised in the Channel. The continuance of its high standard of gunnery has been gratifying.

The Fleet exercises took place during the latter half of June and the beginning of July off the Atlantic coasts of the United Kingdom, the Mediterranean Fleet taking part. Torpedo craft exercises took place concurrently in the North Sea. A collision, in which the Sappho was badly damaged, gave an interesting opportunity to one of the dockyards to show the celerity in repairing work which might be expected under war conditions.

In order to take part in the celebrations in commemoration of the Hudson Tercentenary and the Fulton Centenary, Admiral of the Fleet the Right Hon. Sir Edward Seymour, G.C.B., O.M., G.C.V.O., visited New York as the special representative of the British Navy, in H.M.S. Inflexible, and in command of a squadron composed of that ship and of the Argyll, Drake, and Duke of Edinburgh, from the Fifth Cruiser Squadron, under Rear-Admiral F. T. Hamilton. Sir Edward Seymour earned the warm commendation of His Majesty's Government for the ability and judgment with which he carried out the mission. The occasion was remarkable in that no previous Admiral of the Fleet had hoisted his flag at sea since the reign of George III.

It has been decided that Admiral His Royal Highness the Prince of Wales, K.G., will hoist his standard in the Balmoral Castle of the Union-Castle Line, which is to be commissioned as one of His Majesty's ships for the occasion, in order to pay a State visit to South Africa for the opening of the first Union Parliament. His Royal Highness will be escorted by a first-class armoured cruiser.

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Circumstances combined last summer to give opportunity to a very large number of the British public, and of representatives of the Dominions beyond the seas, to become acquainted with the ships and men of the Royal Navy. The delegates of the Imperial Press Conference visited Portsmouth in May and steamed round the fully-manned vessels of the Home and Atlantic Fleets assembled at Spithead, and witnessed a naval display, in the form of an attack on the Dreadnought by torpedo boats and submarines, followed by an armed landing in boats on Whale Island and a sham fight with a defending force. On the conclusion of the manœuvres the Home and Atlantic Fleets visited the Thames and spent some days anchored in the river, where, as also in the capital, they were given a warm welcome by the citizens of London led by the Lord Mayor and Corporation, to whose initiative the visit was due.

His Majesty the King held a review of the same fleets in the Solent before the beginning of Cowes week.

In January, 1910, the Board of Admiralty were deprived, to their deep regret, of the invaluable assistance of Admiral of the Fleet Lord Fisher of Kilverstone, G.C.B., O.M., G.C.V.O., who had asked to be relieved from his post on reaching the age of 69. Lord Fisher, in addition to most distinguished service as a sea officer, has had a career of unexampled success in high administrative office at the Admiralty, first as Director of Naval Ordnance, afterwards as Third Sea Lord and Controller, then as Second Sea Lord, and finally as First Sea Lord. The measures which are associated with his name and have been adopted by several successive Governments, will prove of far-reaching and lasting benefit to the Naval Service and the country.

I append the usual record of work done by the Department during the past year.

REGINALD MCKENNA.

March 4th, 1910.

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STATEMENT OF WORK, &c., 1909-10.

Changes in the Composition of the Fleets.

Home Fleet.

The scheme of organisation as foreshadowed last year on page 7 of the Statement Explanatory of the Navy Estimates 1909–10 has been generally adhered to throughout the year.

One armoured cruiser, H.M.S. Minotaur, was at the end of January transferred to China for service as the flagship of the Commander-in-Chief on that Station. The two new unarmoured cruisers Boadicea and Bellona have been placed in the fully-manned destroyer flotillas attached to the Home Fleet. The new ocean-going destroyers as they became ready were attached to the First Flotilla, and on the completion of the Zulu and Viking at an early date there will be twelve ocean-going destroyers in the First Flotilla.

Atlantic Fleet, including Fifth Cruiser Squadron.

H.M. Ships Albemarle, Albion, Russell, and Cornwallis have been replaced by four battleships of the Formidable class, and the constitution of the Battle Squadron is now six Formidables. The attached protected cruiser Arrogant has been replaced by the Doris. The four armoured cruisers constituting the Fifth Cruiser Squadron were, at the commencement of the year, H.M. Ships Good Hope, Argyll, Black Prince, and Duke of Edinburgh, but the Good Hope was replaced in July by H.M.S. Drake in order that she might undergo a large refit.

The affiliated vessels Amethyst and Dwarf have been employed on the East Coast of South America and the West Coast of Africa respectively.

Mediterranean Fleet.

In March, 1909, the Swiftsure and Triumph replaced the Glory and Goliath. The Canopus and Ocean have since been replaced by the Cornwallis and Russell.

No change has been made in the attached Armoured Cruiser Squadron, which was renamed the Sixth Cruiser Squadron in March 1909.

The third-class cruiser Medea has replaced the Philomel, which has been transferred to the East Indies Station.

Fourth Cruiser Squadron.

The Euryalus and Cressy have been replaced by the Leviathan and Berwick, and the Essex has been added to the Squadron.

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The Indefatigable (which has now been renamed the Melpomene, in consequence of her name being required for the new armoured cruiser of the Invincible type) and the Scylla have been engaged on duties in the West Indies and on the East Coast of Central America.

The Brilliant has been employed as in previous years in Newfoundland waters during the fishery season, and has recently been cruising in the West Indies.

China.

This Squadron has been strengthened by the substitution of the Minotaur for the King Alfred as Flagship of the Commander-in-Chief.

Australia and Cape of Good Hope.

The composition of these Squadrons has remained unaltered.

East Indies.

Vessels on this station have been largely employed during the year in the suppression of the arms traffic in the Persian Gulf and off the coast of Somaliland. The Diana, Barham, and Philomel were temporarily lent to this station from the Mediterranean to assist in these duties. The Philomel has now been retained for service on the station, and the sloops Alert and Odin, which have been refitted at Bermuda and Simonstown respectively, have been attached to the Squadron for temporary service.

The Squadron will then consist for the time being of H.M. Ships Hyacinth, Fox, Perseus, Proserpine, Philomel, Alert, Odin, Sphinx, Lapwing, and Redbreast.

West Coast of America.

The Shearwater and Algerine have again carried out cruises to various ports in North and South America. The Behring Sea Patrol was carried out by the Algerine.

Cadets' Training Ships.

The Cornwall and Cumberland have again been employed on this service.

Coast-guard and Fishery Service Vessels.

No alteration has been made in these vessels except for the removal of the 30-ton cutter Daisy.

Special Visits.

Admiral of the Fleet the Right Hon. Sir Edward H. Seymour, G.C.B., O.M., G.C.V.O., in H.M.S. Inflexible, visited New York with

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H.M. Ships Argyll, Drake, and Duke of Edinburgh, on the occasion of the Hudson-Fulton celebrations.

H.M. Ships Flora and Cambrian cruised amongst the Pacific Islands and on the West Coast of America during the spring and summer of 1909.

H.M.S. Bedford, from the China Station, visited San Francisco to participate in the Portola Festival. H.M. Ships Shearwater and Algerine were also present.

The Commander-in-Chief, China, with his squadron, again visited Yokohama this year, and paid visits to other Japanese ports.

Manœuvres.

Throughout the year the Commanders-in-Chief have carried out tactical and other exercises with the vessels under their orders.

Combined exercises were carried out by the Home and Atlantic Fleets in the North of Scotland in April and May, 1909.

The annual manœuvres were carried out at the end of June and beginning of July. In addition to the strategical exercise in which the Home, Mediterranean, and Atlantic Fleets took part, torpedo boat and submarine exercises were also carried out concurrently. Altogether 370 vessels were engaged.

Reviews.

Prior to the manœuvres the fully-manned vessels of the Home Fleet and the Atlantic Fleet were assembled at Spithead on the occasion of the visit to Portsmouth of the delegates of the Imperial Press Conference. After the manœuvres the same fleets visited the Thames at the invitation of the Lord Mayor and Corporation of London. They then proceeded to Cowes, where they were reviewed by His Majesty the King.

PERSONNEL.

Officers.

The recommendations of a Committee appointed to enquire into and report upon the Naval Medical Service are now under consideration, but in the meantime certain minor suggestions for the improvement of the regulations for entry and examination, and for training after entry, have already been adopted and Naval Medical Officers undergoing Post-graduate Courses in the London Hospitals are now accommodated at the Royal Naval College, Greenwich.

Arrangements have been made with the Sanitary Commissioners at Gibraltar for the admission to their laboratories of Naval Medical

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Officers stationed at that port or belonging to visiting ships. As these laboratories are excellently equipped with up-to-date appliances it is anticipated that they will be of great use to the Navy Medical Service, both for research work and instructional purposes.

The list of Accountant Officers has been increased to meet the requirements of the Service.

The courses for Senior Officers at the Royal Naval War College and at the Gunnery, Torpedo, and Signal Schools, have been reorganised so as to enable, as far as possible, captains and commanders to be appointed to these courses immediately after promotion to their respective ranks.

Authority has been obtained to continue the payment of Flag Allowances to officers of a flagship which may pass outside the limits of her station for exercises or manœuvres.

It has been decided to grant the honorary rank of Lieutenant on retirement to Chief Officers of Coast-guard who have served in charge of a wireless telegraph station for five years or of a visual war signal station for eight years, provided they have shown special zeal and ability. Extra pay will be granted to Chief Officers of Coast-guard appointed in charge of wireless telegraph stations.

Men.

Owing to the basin accommodation at Chatham now occupied by the Tenedos training establishment for boy artificers, and by the Acheron training ship for stokers, 2nd class, being required for ships of the Home Fleet, it has become necessary to remove those vessels.

It has, therefore, been arranged for the training of the Boy Artificers of the Chatham Establishment to be carried out at Devonport and for the Stokers, 2nd Class, now accommodated in Acheron to be transferred to the Royal Naval Barracks at Chatham, the stokehold and mechanical instruction now undergone in that hulk being carried out in workshops on shore.

As soon as the vessel now being fitted for the accommodation of the Boy Artificers at Devonport is ready to receive them, and the transfer of ships and machinery and other necessary arrangements have been completed, the Boy Artificers of the Chatham Establishment will be removed to Devonport. The Stoker Petty Officers going through the mechanician course in the Indus, at Devonport, will simultaneously be transferred to the Royal Naval Barracks at Chatham, and their mechanical training will be carried out in future in the workshops at the latter port. It is not anticipated that this change can be effected before the summer, but the transfer to the

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Barracks of the Stokers, 2nd Class, under training in Acheron will take place very shortly.

The Nelson training ship for 2nd Class Stokers at Portsmouth has been paid off, and the Stokers, 2nd Class, removed to Barracks, their mechanical and stokehold training being provided for in the Renown.

The system of training men belonging to the Royal Naval Auxiliary Sick Berth Reserve has been standardised, and syllabuses of instruction issued for the guidance of Captains of H.M. ships and Inspectors General of Hospitals to which Reservists are sent for training.

The system of employing Naval ratings upon the duties of Officers' Stewards and Cooks, 3rd class, which was made general last year for Seamen has since been extended to allow Stokers as well as Seamen to volunteer for this work.

In consequence of the number of invalidings from the Service on account of defective teeth, consideration has been given to the question of how best to deal with this source of wastage to the Navy. The facilities for dental examination and treatment of boys and men at the Home ports prior to their being drafted away have been increased, and steps have been taken to provide against men being invalided out of the Service solely on account of defects to the teeth which might be remedied by treatment.

In order that men serving abroad shall not be at a disadvantage with those at home in the matter of qualification for advancement, arrangements have been made for the educational examination for the rating of Petty Officer to be held abroad under the same conditions and at similar times as at home.

The concentration of the training of Band ranks at the Royal Naval School of Music at Eastney having been tried for a year with successful results, has now been definitely approved. A steady increase has been maintained in the output of Bands for service in the Fleet.

The opportunity has been taken of modifying the regulations governing the pay of the Writer class so as to provide that Writers of a lower grade doing duty in a vacancy for Chief or First Writer shall receive the pay of the higher rating, and that the service qualification required for advancement from one grade to another may be dispensed with in very exceptional cases.

The rate of pay allowed to ratings selected to perform the duties of Naval Schoolmaster on board sea-going ships in which no Naval Schoolmaster is borne has been revised, and the conditions of payment amended so as to enable such ratings to receive remuneration for

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independent lessons given, as well as for instruction continued over long periods. It has also been decided to extend this system of employing Naval ratings as Acting Schoolmasters from sea-going ships to establishments on shore, and Petty Officers and others not belonging to the Schoolmaster branch may now be employed in assisting Naval Schoolmasters in these establishments in such numbers as may be determined by the Admiralty.

It has hitherto been the rule that men whose continuous service engagements expire while they are abroad, but who remain voluntarily until the end of the commission, are not eligible for the benefit of foreign service leave. This restriction has now been removed, and such men on their arrival in England are borne on ship's books for the period allowed under the scale of leave on full pay for foreign service before they are finally discharged.

During the financial year 1908–09, 8337 entries from the shore were made by the various recruiting agencies. During the first nine months of the current financial year over 7000 men and boys were recruited for various ratings. No difficulty has been experienced in securing a sufficient number of candidates for all ratings; indeed, conditions generally have been continuously favourable to recruiting and the candidates offering themselves have been of a good class.

Satisfactory progress has been made with the development of the revised Victualling arrangements in the Fleet, which were introduced in the latter part of 1907–08, and the new system continues to be very successful in every way.

The general Mess system of Victualling is working well in the Boys' training establishments and in the Stoker training establishment at Portsmouth; it has been extended during the current financial year to the boys embarked for training in the Fourth Cruiser Squadron. Its introduction in the Stoker training establishment at Chatham has been delayed owing to the transfer from the Acheron to the Royal Naval Barracks. A start will be made as soon as the transfer has taken place.

The new canteen arrangements continue to work smoothly and to give satisfaction.

Progress has been made with the revised cookery arrangements in the Fleet so far as the number of cook ratings has permitted, and it is hoped that greater progress may be possible next year.

An improved scale of mess utensils for Petty Officer ratings has been introduced during the year.

Royal Fleet Reserve.

The numbers of the Royal Fleet Reserve have risen during the

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year from 19,613 to 20,813, the distribution on December 31st, 1909, being as follows:—

	Class A.	Class B.	Total.
Seamen, &c.	3,359	7,695	11,054
Stokers	1,486	3,212	4,698
Marines	1,715	3,346	5,061
	6,560	14,253	20,813

It has been decided that in future all men in the Reserve shall be required to perform seven days' drill in each calendar year, the option of performing a double drill every alternate year being withdrawn. The new rule has been made applicable immediately to all entries in the Reserve, and will apply to men already serving after December 31st, 1909.

Royal Marines.

The numbers borne on March 31st, 1910, will be about 16,300. There will also be about 1300 Royal Marines for Naval Bands.

The division of the officers of Royal Marines into two separate lists, Royal Marine Artillery and Royal Marine Light Infantry, in the year 1863 has resulted in considerable inequality in the rates of promotion to the various ranks. To obviate the inconveniences caused by such inequality, when officers are so closely connected in their duties, an Order-in-Council has been issued directing that when officers of the Royal Marine Artillery and Royal Marine Light Infantry are serving together in the performance of duties peculiar to the corps, Brevet rank granted for length of service shall take rank and precedence with corresponding substantive rank according to the date on which they were conferred.

The extension of employment of Royal Marine officers in the Fleet in various naval duties as well as in Wireless Telegraphy, etc., has made good progress; such extra work is generally appreciated by the officers themselves and has considerably enhanced their value to the Navy.

During the year the branches of the Royal Naval School of Music at other Divisions have been abolished and the whole of the Band ranks on shore concentrated at Eastney with advantages already apparent in the improvement in training and the increased rate of the turn out of bands. The number of bands embarked under the new scheme is 52, an increase of eight during the year, and it is anticipated that this number will be increased by three by the end of the month.

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The qualification of trained men in gunnery had become so general among the non-commissioned officers and men of the Royal Marine Light Infantry that the distinctive non-substantive rating (T.M.) for Royal Marine Light Infantry has been abolished. All efficient Royal Marines are expected to maintain that standard.

The re-arming and re-equipping of the corps with the short rifle and new pattern woven web and brown leather bandolier equipments has begun.

As a consequence of the re-armament, the revised scheme of musketry training which has been brought into use in the Army is being adopted for the Royal Marines on shore, and for those serving in H.M. ships at a port where a suitable range is available.

The system of technical training for men about to leave the corps to prepare them for civil life, which was inaugurated at Eastney in 1908, continues to be productive of excellent results in obtaining highly paid employment for late Royal Marines as chauffeurs, electricians, and in ordinary trades. Under this system, at very little expense to the Crown, the men trained are fitted to cope with the difficulties of obtaining satisfactory employment after leaving the Service. The same system is to a lesser extent carried out at the other divisions.

Coast-guard.

The total numbers of Stations and Detachments at present manned in peace is 600.

The numbers borne on January 1st, 1910, were :—

District Captains, District Paymasters and Staff.	35
Divisional Officers	81
Chief Officers and Men	3,158
	3,274

The closing of redundant stations ceases after May 15th, 1909, as all stations now manned are required for Naval or Revenue duties, or to assist in the life-saving services.

New Wireless Telegraph Stations have been completed during 1909 at Cleethorpes, Aberdeen, Ipswich, and Pembroke, and the station at Rosyth is nearing completion.

The men of the Signal Section were embarked for 28 days training during the year.

The introduction of a higher scale of extra pay for Coast-guard wireless telegraph ratings, and the grant of other advantages to

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wireless telegraph ratings as regards promotion, have made the Wireless Telegraph Section more popular in the Coast-guard, and both officers and men take keen interest in their work.

Royal Naval Reserve.

Of the total numbers of 19,790 borne on January 1st, 12,282 had been transferred to the new system of training.

The strength of the Royal Naval Reserve (Home) on December 1st, 1909, was:—

Executive Officers	1,389
Commissioned Engineer Officers	240
Warrant Engineers	102
Engine Room Artificers	577
Seaman Ratings	12,961
Stoker Ratings	5,579

Of the above executive officers 515 have undergone 12 months' training in the fleet and are in receipt of training fees. In addition to these, 66 are now undergoing this training.

The following numbers have performed courses of instruction, drill, and training during the twelve months ended November 30th, 1909:—

	Short Courses.		New System.		Old System.
	Gunnery and Torpedo.	Signal.	Three Months' Training afloat.	Annual or Biennial Training.	Drill.
Executive Officers	75	18	—	223	404
Seamen ratings	—	—	389	2,278	6,988
Stoker ratings	—	—	445	1,637	1,074

The training in ships of the Home Fleet under the new system is very valuable, and will render the Royal Naval Reserve Force an efficient portion of the naval *personnel*.

The number of officers serving in the gunnery and torpedo establishments at the two Home ports, and of officers and men undergoing periodical training in ships of the 3rd Division of the Home Fleet, increases as the new system becomes more generally adopted.

Approval has recently been given to an amendment of the regulations governing the promotion of Sub-Lieutenants to the rank of Lieutenant, R.N.R. The main principle adopted in these new

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regulations is that all Sub-Lieutenants who have satisfactorily undergone courses and 12 months' naval training will, after attaining two years' seniority in that rank, be eligible for promotion to Lieutenant, without regard to any fixed requirements of service in the Mercantile Marine. It is thought that this new ruling will operate more satisfactorily than the previous regulations, and will emphasise the importance of the 12 months' naval training.

Sanction has been given to the payment of war retainers to Engine Room Artificers, R.N.R., when called out on mobilisation, so as to put these ratings on the same footing as seamen and stoker ratings.

Royal Naval Volunteer Reserve.

The strength of the Force in six Divisions, comprising forty-four companies, is as follows:—

Royal Naval Volunteers.	Establishment.	Strength, Jan. 1st, 1910.
Officers	194	161
Honorary officers	—	18
Petty officers and men	4,318	3,986
Permanent Staff—		
Officers	7	7
Petty officers and men	70	69

Approval has been given during 1909 to the formation of two additional companies, *i.e.*, one at Greenock (Clyde Division), making a total of three companies at that place, and one at Newhaven (Sussex Division), making a total of two companies at that place.

During the current financial year the following numbers have embarked for training afloat for 14 or 28 days in ships of the Home Fleet:—

Officers	42
Petty Officers and men	1,273

A large number of these officers and men were embarked during manœuvres.

Officers and men have also undergone courses at the various schools in gunnery, torpedo, signalling and telegraphy during the year, and the following have passed and obtained certificates:—

——	Gunnery.	Torpedo.	Signalling and Telegraphy.	Total.
Officers	26	4	—	30
Petty Officers and men	45	12	8	65

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One Medical Officer has undergone a fourteen days' course of instruction at Haslar Hospital.

There are now over 200 qualified R.N.V.R. signalmen.

Up till the beginning of 1909, men who qualified in signals retained their seaman ratings, and had in consequence to spend a considerable portion of their instructional time in gunnery, &c. In order to obviate this, and to allow such men to devote almost the whole of their instructional time to signalling, a separate signal branch of the R.N.V.R. has been established with the same titles, grades, &c., as obtain in the signal branch of the Royal Navy, the higher ratings being obtainable only by passing special examinations in signalling subjects.

This signal branch will be restricted to 15 per cent. of the total strength of the R.N.V.R.: increased efficiency and a general higher standard of signalling are anticipated as a result of the establishment of this special branch.

The system of issuing free kits to the R.N.V.R. when enrolled and re-enrolled was not found to be wholly satisfactory, and on January 1st, 1910, a new system came into force, where the Annual Capitation Grant for the R.N.V.R. will be increased from 35*s.* to 50*s.* per annum. Out of that sum the various Divisions will be required to pay for the kits of all men enrolled and re-enrolled.

Greenwich Hospital.

Northern Estates.

All the farms are let and the revenue from both surface and mineral rents are likely to be fully maintained.

Greenwich Estate.

The policy of bringing the property at Greenwich into conformity with modern requirements, so far as the conditions permit, is being consistently pursued with beneficial results both to the locality and to the income derived by Greenwich Hospital from the estate.

Royal Hospital School.

The standard of efficiency has been maintained at its usual level, and the highest possible educational grant has again been earned.

Painted Hall.

It is anticipated that the work of strengthening the roof over the hall will be completed in the course of the present financial year.

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Chapel.

The installation of electric light in the chapel has rendered it possible for evening service to be held for the residents at the college and school throughout the year.

The design of the fittings is well in keeping with the character of the building, being an adaptation of a design of the period in one of Wren's churches.

Pensions.

It has been decided that the transfer of the Naval Age Pension of men of the Seamen Pensioner Reserve from Naval to Greenwich Hospital funds shall be deferred until in the ordinary course of selection the men obtain an award of the Greenwich Age Pension. The effect of this will be to bring about a more equitable distribution of the sum allotted for Age Pensions.

The charge for the maintenance in Yarmouth Hospital of men eligible for the benefits of Greenwich Hospital will also be transferred from Greenwich Hospital to Naval Funds.

ORDNANCE.

Guns.

Satisfactory progress has been made in the manufacture and supply of guns. The 12-in. guns for the St. Vincent class were completed and supplied by the dates they were required by the shipbuilders.

Ammunition.

Further improvements in designs of projectiles have been effected both as regards safety, effectiveness, and increased ranging powers.

Cordite.

Measures have been taken during the year which, it is hoped, may ensure greater regularity of ballistics than was obtained under the old conditions.

Gun Machinery.

Satisfactory progress has been made in bringing the older types of 12-in. mountings up to modern requirements, and has resulted in increased accuracy of fire.

All three ships of the St. Vincent class have satisfactorily carried out their gunnery trials.

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Gunnery Training Practice.

Target Practice.—The annual tests of gun-layers and the battle practice were carried out in 1909 under conditions very similar to those in 1908, and the results show a further improvement.

The rules for the tests of gunlayers have been revised for 1910, the same general principles being retained.

The regulations for the battle practice of the Fleet during 1910 have been modified so as to still further assimilate the conditions of this practice to those which may be expected to obtain in action.

Torpedoes.

The developments of the torpedo referred to last year have continued with most satisfactory results.

Mining and Mine Sweeping.

Great attention has been devoted to this important work during the year, and satisfactory progress has been made in the development of all its branches. The mining service was exercised during the manœuvres.

Wireless Telegraphy.

Practically all ships have now been fitted with the latest pattern wireless telegraphy installations, which are working satisfactorily.

A number of important shore stations have been completed.

Inspection and Proof.

The assumption by the Admiralty of responsibility for all designs of naval ordnance and ordnance matériel has been found a distinct advantage.

The arrangements for inspection at contractors' works and the control by the Admiralty of the inspection of projectiles and all steel for ordnance in the North of England is working satisfactorily.

Steps are being taken to provide more suitable accommodation at Sheffield for "testing" work in this connection.

Ordnance and Torpedo Depôts.

The new Torpedo Factory at Greenock and range at Loch Long will be occupied during the summer of 1910, and arrangements are in progress for the transfer of the torpedo factory men and their families at Government expense from Woolwich to Greenock.

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The new Torpedo Depôt at Keyham has been opened.

On April 1, 1909, the Admiralty took over from the War Department the conduct of the naval ordnance business at Hong Kong. At all the large depôts at home and abroad the Admiralty now have direct control of naval ordnance duties.

FUEL AND STORES.

Fleet Coaling.

Steam Vessel Coals.

Much organizing work has been done during the past year in connection with the arrangements for meeting Fleet requirements promptly under all conditions.

Progress is being made in the work of increasing the accommodation for coals, and in the provision of efficient coal-handling machinery.

Oil Fuel.

A large number of tanks have been completed and filled, and additional tanks have been arranged for, in order to keep pace with increased requirements consequent on the increase in the number of ships fitted to burn this description of fuel. The facilities for the supply of oil fuel by contract at a number of ports have also been considerably added to, particularly in the direction of taking advantage of the Scotch shale oil industry.

The Admiralty tank steamer "Petroleum" has been remuneratively employed in freighting oil fuel.

Petrol for Submarines.

A stock of petrol has been laid down in Admiralty tanks, and further tanks have been arranged for.

Naval Stores.

In order to meet the increasing requirements of fleets in Home waters, arrangements have been completed for storing ships of a division of the Home Fleet from Portland in future.

Several improvements in organization for storing fleets in general have also been introduced, and others are in contemplation.

Important changes have been adopted for facilitating the supply and return of stores and materials connected with dockyard work.

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New Construction.

The new battleship Neptune, which was laid down at Portsmouth on the 19th January, 1909, was launched on the 30th September, 1909, and the armoured cruiser Indefatigable, of improved Invincible type, laid down at Devonport on the 23rd February, 1909, was launched on the 28th October, 1909. Substantial progress has been made during the current year on both ships, and it is expected that they will be completed within a period of two years from the dates of laying down.

The Boadicea, owing to the late delivery of capstan and consequent delay in steam trials, was not completed at Pembroke in the financial year 1908–9 as originally anticipated. Her completion was, however, secured by June, 1909, and she is now employed on active service.

The Bellona, unarmoured cruiser, laid down at Pembroke in June, 1908, has satisfactorily carried out all her steam trials and is now in commission.

Good progress is being made with the five protected cruisers of the Bristol class ordered by contract in the financial year 1908–9, and they have all been launched during the current financial year.

The sixteen destroyers of the Beagle class ordered in 1908–9 are well advanced and will, it is expected, all be completed by the contract dates.

The following fighting vessels were provided for in the programme for the present financial year, and orders have been placed for the whole of them.

Armoured Vessels (8).

Orion, Lion, Hercules, Colossus, Conqueror, Monarch, Thunderer, Princess Royal.

Protected Cruisers (4).

Dartmouth, Falmouth, Weymouth, Yarmouth.

Unarmoured Cruisers.

Blanche, Blonde.

Torpedo Boat Destroyers (20).

Acorn, Alarm, Brisk, Cameleon, Comet, Goldfinch, Fury, Hope, Larne, Lyra, Martin, Minstrel, Nemesis, Nereide, Nymphe, Redpole, Rifleman, Ruby, Sheldrake, Staunch.

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Submarines.

Six boats have been ordered, four by contract and two dockyard built, all of D class.

Of the foregoing vessels the armoured vessels Orion and Lion have been laid down at Portsmouth and Devonport Dockyards respectively; the Hercules at the works of the Palmers' Shipbuilding Co., at Jarrow-on-Tyne; and the Colossus at the works of Messrs. Scott's Shipbuilding Co., at Greenock. Materials are being collected for the construction of the hulls and machinery of the remaining four armoured vessels so as to ensure their completion by the 31st March, 1912.

Tenders have also been obtained for two armoured cruisers for the Governments of the Commonwealth of Australia and New Zealand.

The four cruisers of the Dartmouth class, which are improved Bristols, have been ordered by contract and are making satisfactory progress.

The Blanche, unarmoured cruiser of the improved Boadicea type, was launched at Pembroke Dockyard on the 25th November, 1909, and will be completed in the course of the next financial year, and the Blonde, a sister vessel, was laid down at Pembroke on the 6th December, 1909, and will be completed within a period of twenty-one months.

The twenty vessels of the Acorn class have been ordered by contract and good progress is being made with them. It is expected that they will be completed by the contract dates. These vessels were designed at the Admiralty instead of by their respective builders as was the former practice.

The two further submarine boats of the C class, Nos. 33 and 34, laid down at Chatham in March, 1909, are now well advanced.

Two large floating docks have also been ordered, one from Messrs. Swan, Hunter & Co., Wallsend-on-Tyne, and one from Messrs. Cammell, Laird & Co., Birkenhead.

Other Vessels.

The following tugs and other small vessels have been completed:—

Rambler, large paddle tug for Dover.
Pilot, large twin-screw tug for Portsmouth.
Atlas, large twin-screw tug and water-tank for Hong Kong.
Seven lighters.

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The following tugs and other small vessels have also been commenced:—

Hellespont, paddle tug for Haulbowline.
Firm, paddle tug.
Alliance, screw tug.
Resource, mooring steamer for Portsmouth.
Urgent, water-tank vessel.
One mooring lighter for Sheerness.

Vessels being converted for various Services.

The Apollo and Andromache have been fitted for service as mine-layers, and the Naiad and Intrepid are being similarly altered.

The Ganges (late Agincourt) coal depôt will be completed next year.

During the year the fitting of magazine cooling arrangements has been practically completed in the various fleets.

Six trawlers have been bought for subsidiary services.

Machinery and Boilers.

The usual practice as regards fitting water-tube boilers in warships has been continued.

Where practicable, interchangeability of the auxiliary machinery, and the principal parts of the main machinery as a whole, has been secured, and this practice is being continued for ships of the same class.

Satisfactory results continue to be obtained with turbine propelling machinery, which type is now installed in all warships under construction.

Liquid Fuel.

During the year oil-burning appliances have been completed and tried in the armoured vessels Defence, Invincible, Bellerophon, Superb, Temeraire, St. Vincent, Vanguard and Collingwood.

The policy outlined in last year's Statement in regard to use of oil fuel for the boilers of all armoured vessels under construction is being continued.

The Boadicea and Bellona, which were designed to burn oil in conjunction with coal when obtaining their full powers, have carried out their full-power trials with satisfactory results.

The boilers for the second-class protected cruisers of the Bristol class, Blonde, Blanche, Weymouth, Yarmouth, Falmouth and Dart-

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mouth are designed to burn oil in conjunction with coal when obtaining full power.

Experimental work connected with the burning of oil fuel is still in progress at Haslar and also in the Surly.

Arrangements are being made to obtain further experience by extending the supply of these fittings.

During the year a large amount of work has been done in designing special furnace fittings for use with boilers using oil fuel, which has led to simplification in the supply and maintenance of the stores required for repair of these fittings.

Satisfactory progress is being made in the instructional work at Portsmouth and in the Fleet.

Internal Combustion Engines.

Satisfactory trials have been carried out with the oil-driven electric generating machinery installed in the St. Vincent class and in the Vernon for instructional purposes.

Most of the motor boats using heavy oil (with high flash point) have been appropriated to Harbour Service and much valuable experience has been obtained. Up to the present, however, it has been considered that there are not sufficient advantages to warrant replacing steam machinery by oil engines in the power boats attached to ships, except in special cases.

LARGE REPAIRS.

The following is a list of the important vessels that have been or are expected to be wholly or partially refitted under this heading in 1909–10 :—

Battleships.—London, Venerable, Prince George, have been completed.

Armoured Cruisers.—Good Hope, Euryalus, will be advanced; Hogue has been completed.

Protected Cruisers.—Æolus, Vindictive, Sappho, will be completed; Highflyer, Pelorus, will be advanced.

Sloops and Gunboats.—Dryad, Skipjack, Alert, have been completed; Hazard, Éspiegle, Antelope, will be completed; Hebe, will be advanced.

Depot Ship for Destroyers.—St. George has been completed.

Mine Layers.—Andromache, Apollo, have been completed; Naide, Intrepid, will be advanced.

Hulk for Instructional Service.—Pomone has been completed.

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NEW WORKS.

Bermuda.—House for hydraulic engine and boiler, etc. This work is practically completed.

Cape of Good Hope.—Simon's Bay Dockyard Extension.

The items comprised in the main contract are completed or closely approaching completion. Various incidental services, including the extension of the electric light and power station, water supply, crane roads, etc., are being carried out by departmental labour or local contract.

The Coaling Depôt Coal Sheds (Old Yard) are nearly finished.

The cooling of the Cordite Magazines in the Naval Ordnance Depôt is well advanced.

Chatham.—The extension of No. 4 Dock is finished; the gymnasium at the R.N. barracks practically so.

Good progress has been made with the extension of No. 1 boiler shop and the electric light and power station for Lodge Hill and Chattenden.

Coast-guard Signal Stations.—The stations at Pembroke, Ipswich, Culver Cliff and Horsea Island have been entirely completed.

The stations at Cleethorpes, Aberdeen and Rosyth are at work, but the provision of quarters is not complete.

Deal.—Relaying Drainage, R.M. Barracks.—Provision was made in Annual Estimates, 1909–10, for drainage work to be carried out on Admiralty property in conjunction with a scheme to be devised by the local authorities and approved by the Local Government Board The latter is not yet settled, and the Admiralty work in connection with it has consequently not yet begun.

Dover.—Harbour Works.—The whole of the contract work is completed.

The necessary dredging is being proceeded with.

Gibraltar.—Dockyard Extension.—The whole of this work is completed with the exception of a few minor incidental services which are in hand.

Police Quarters.—This work will shortly be finished.

Railway, etc., from South Mole to Hospital.—Completed.

Harwich (Shotley).—The work of providing additional accommodation at the Training Establishment is well advanced.

Haulbowline.—Lengthening Dock.—This work is now well advanced.

The extension of the fitting and turning shop and foundry has been begun.

Hong Kong.—Dockyard Extension.—The extension works are now practically finished.

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The workshed on west side of dock and the new storehouse are completed.

The reclamation at Kowloon is well advanced.

Contracts have been let for the quarters for dockyard foremen and leading men, the oil store, and part of the work connected with the transfer of the Victualling Yard from Hong Kong to Kowloon.

Jamaica.—The extensive repairs to jetty and coalsheds are being executed by the War Department.

Malta.—The construction of the breakwater lighthouse and quarters for lighthouse keepers will be begun in the Spring as soon as the weather permits.

The extension of the water-tube boiler shop and gunmounting store is in hand.

Plymouth.—Keyham Dockyard Extension.—The boathouse is finished. The various workshops and stores are completed or nearing completion. The torpedo depôt, railways and crane roads, etc., are also approaching completion. The central offices are in hand.

A contract has been let for the caisson between Nos. 2 and 3 Basins, North Yard.

The extension of the machine shop, South Yard, the building for air compressors, South Yard, and the coaling depôt, North Yard, are in hand.

The additions to the electric light and power station and the new smithery, etc., North Yard, will shortly be begun.

Portland.—The rebuilding of the outer part of the boat camber and the officers' recreation ground are practically completed.

A contract for the office accommodation will shortly be let.

Portsmouth.—Good progress is being made with the new lock.

The following works have been completed:—Lengthening No. 1 Dock. Renewing and extending railways.

The following items are practically finished:—Repairs to old joiners' shop. New infectious hospital, Osborne R.N. College. Additional accommodation, Osborne R.N. College. Reconstruction of flats, Haslar Hospital. Harbour protection.

Considerable progress has been made with the following works:—New joiners' shop. Police section house, Gymnasium and swimming bath, R.N. Barracks. Lunatic ward, Haslar Hospital. Reconstructing No. 3 staircase, Haslar Hospital.

Contracts have been let for:—The dolphins required for the rearrangement of moorings. The steelwork to be used in extending the boiler shop.

The extension of the electric light and power station has been abandoned in favour of a larger scheme for which provision has been made in the Estimates for 1910–11.

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Preliminary works in connection with the new magazines at Bedenham are well in hand.

The extension of the electric light and power station at Priddy's Hard and the squash racquets and five courts at Dartmouth have been begun.

Rosyth.—Good progress is being made with the new Naval Depôt and preparations are being made for letting a contract for the new magazines.

Sheerness.—The extension of the rifle range has been begun.

Shoeburyness.—The work of providing increased facilities for proof of cordite is approaching completion and the new pier is in hand. These works are being carried out by the War Department.

Sydney.—The cooling of the cordite magazines is finished.

Woolwich.—Additional Railway Facilities.—This work, which is being carried out by the War Department, is nearing completion.

Torpedo Ranges.—The torpedo factory at Gourock is well advanced. A contract for a torpedo range at Arrochar has been let and considerable progress has been made with this work.

Coaling Facilities and Fuel Storage.—The oil fuel installations at the Medway and at Gibraltar, Haulbowline, Malta, Plymouth, Portland and Portsmouth are nearing completion.

The coalsheds at Hong Kong have been completed.

Accommodation and Storage of Submarines.—The submarine depôt at Dover is being proceeded with.

The principal new works provided for in 1910–11 are—

Chatham.—House for distilling machinery. Lodge Hill ordnance depôt. Additional laboratory accommodation. Safeguarding magazines. Detention quarters. Additional accommodation for oil fuel. Coaling depôt.

Coast-guard, Signal Stations, etc.—Wick, Sennen Cove, Totland and Dover.

Dover.—Accommodation for oil fuel.

Greenwich.—Fire precautions.

Hong Kong.—Kowloon coalsheds on reclamation.

Pembroke.—Accommodation for torpedo boat destroyers.

Plymouth.—Docking accommodation for torpedo boat destroyers. Detention quarters.

Portsmouth.—New entrance to No. 4 basin and new dock. No. 3 ship shop. New gantries. Extending electric light and power station. Accommodation for floating dock. Detention quarters.

Generally.—Fire precautions.

R. McK.

March 4th, 1910.

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STATEMENT showing the GROSS EXPENDITURE on NAVAL SERVICES for the years 1906–1907 to 1908–1909, together with the ESTIMATED GROSS EXPENDITURE for 1909–1910 and 1910–1911.

—	ACTUAL EXPENDITURE.			ESTIMATED EXPENDITURE.	
	1906–1907.	1907–1908.	1908–1909.	1909–1910.	1910–1911.
	£	£	£	£	£
Gross Expenditure (Navy Vote) (*a*)	33,262,649	32,866,506	33,827,491	36,782,990	42,412,524
Abate: Annuity under the Naval Works Acts, 1895 to 1905	1,094,309	1,214,402	1,264,033	1,330,356	1,322,752
	32,168,340	31,652,104	32,563,458	35,452,634	41,089,772
Expenditure from Loans	2,431,201	1,083,663	948,262	—	—
Value of Stores drawn from stock, without replacement, in aid of cash expenditure ...	1,024,200	1,294,802	551,125	156,000	20,800
Expenditure on behalf of Naval Services from Votes of other Departments	354,084	341,346	376,618	394,565	373,558
TOTAL	35,977,825	34,371,915	34,439,463	36,003,199	41,484,130

(*a*) In the years 1909–10 and 1910–11 expenditure on the completion of services originally scheduled in the Naval Works Acts, 1895 to 1905, is provided for entirely under "Gross Expenditure (Navy Votes)."

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Abstract of Navy

Votes.		Estimates,	
		Gross Estimate.	Appropriations in Aid.
	I.—Numbers.		
A.	Total Number of Officers, Seamen, Boys, Coast-guard, and Royal Marines	131,000	....
	II.—Effective Services.	£	£
1	Wages, &c., of Officers, Seamen and Boys, Coast-guard, and Royal Marines	7,343,600	154,200
2	Victualling and Clothing for the Navy . . .	3,087,649	587,349
3	Medical Establishments and Services . . .	281,817	17,917
4	Martial Law	11,000	100
5	Educational Services	219,265	61,865
6	Scientific Services	98,897	29,697
7	Royal Naval Reserves	382,116	9,616
8	Shipbuilding, Repairs, Maintenance, &c.:		
	Section I.—*Personnel*	3,465,700	21,600
	Section II.—*Matériel*	5,157,200	543,100
	Section III.—Contract Work	12,563,500	168,100
9	Naval Armaments	2,906,000	125,000
10	Works, Buildings, and Repairs at Home and Abroad .	3,025,300	30,000
11	Miscellaneous Effective Services	472,327	13,327
12	Admiralty Office	397,585	8,785
	Total Effective Services . . . £	39,611,956	1,770,656
	III.—Non-Effective Services.		
13	Half-Pay and Retired Pay	939,512	15,012
14	Naval and Marine Pensions, Gratuities, and Compassionate Allowances	1,453,116	22,716
15	Civil Superannuation, Compensation Allowances, and Gratuities	407,940	440
	Total Non-Effective Services . . £	2,800,568	38,168
	Grand Total . . . £	42,412,524	1,808,824

Provision to the extent of £363,523 is included in the Estimates for 1910–1911 under Votes 8, 10 and 12, for the Acts, 1895 to 1905.

In addition to the Cash expenditure, stocks of Stores purchased in previous years

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Estimates for 1910–1911.

1910–1911.	Estimates, 1909–1910.			Difference on Net Estimates.		Votes.
Net Estimate.	Gross Estimate.	Appropriations in Aid.	Net Estimate.	Increase.	Decrease.	
Total Numbers. 131,000	128,000	...	Total Numbers. 128,000	Numbers. 3,000	...	A.
£	£	£	£	£	£	
7,389,400	7,432,949	152,749	7,280,200	109,200	...	1
2,500,300	2,985,631	568,831	2,416,809	83,500	...	2
263,900	279,734	21,034	258,700	5,200	...	3
10,900	12,820	120	12,700	...	1,800	4
157,400	223,873	64,573	159,300	...	1,900	5
69,200	96,818	29,518	67,300	1,900	...	6
372,500	376,527	9,527	367,000	5,500	...	7
						8
3,444,100	3,169,700	21,500	3,148,200	295,900	...	Sec. I.
4,614,100	4,765,100	373,000	4,392,100	222,000	...	Sec. II.
12,395,400	8,443,370	165,070	8,278,300	4,117,100	...	Sec. III.
2,781,000	2,521,000	140,000	2,381,000	400,000	...	9
2,995,300	2,950,300	34,000	2,916,300	79,000	...	10
459,000	452,300	13,500	438,800	20,200	...	11
388,800	386,975	8,775	378,200	10,600	...	12
37,841,300	34,097,097	1,602,197	32,494,900	5,350,100	3,700	
924,500	905,201	15,001	890,200	34,300	...	13
1,430,400	1,410,482	22,682	1,387,800	42,600	...	14
407,500	370,210	410	369,800	37,700	...	15
2,762,400	2,685,893	38,093	2,647,800	114,600	...	
40,603,700	36,782,990	1,640,290	35,142,700	5,464,700	3,700	
			Net Increase			£5,461,000

continuation of services originally provided for out of funds raised under the authority of the Naval Works will be drawn upon without replacement to the extent of £20,800 (estimated).

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STATEMENT of the Principal Points of DIFFERENCE between the ESTIMATES of 1909–1910 and those for 1910–1911.

INCREASES.		
		£
Wages, &c., of Officers, Seamen and Marines		109,200
Victualling and Clothing for the Navy		83,500
Medical Establishments and Services		5,200
Scientific Services		1,900
Royal Naval Reserves		5,500
Wages of Artificers and Police in Dockyards		289,664
Naval Stores and Fuel, &c., for the Fleet		386,100
Propelling Machinery for His Majesty's Ships and Vessels (Contract)		878,780
Hulls of Ships (Contract)		1,647,086
Armour for His Majesty's Ships and Vessels (Contract)		1,757,969
Repairs and Alterations by Contract of Ships, &c.		15,000
Inspection of Contract Work		20,000
Wages of Artificers and Police in Naval Ordnance Establishments		14,532
Guns		292,300
Projectiles and Ammunition		30,000
Torpedoes and Gun-cotton		60,600
Decrease in Amount of Receipts arising from the Sale of Unserviceable Naval Ordnance Stores		14,158
Works, Buildings, and Repairs		79,000
Miscellaneous Effective Services		20,200
Non-Effective Services		114,600
Miscellaneous Increases		8,916
	£	5,834,205
DECREASES.	£	
Martial Law	1,800	
Educational Services	1,900	
Small Arms, Maintenance of Naval Ordnance Vessels, and Miscellaneous Naval Ordnance Stores	8,000	
Increase in Amount of Receipts arising from the Sale of Ships	162,800	
Auxiliary Machinery for His Majesty's Ships and Vessels (Contract)	55,968	
Gun Mountings and Air-Compressing Machinery (Contract)	105,737	
Machinery for His Majesty's Shore Establishments (Contract)	10,000	
Purchase of Ships, Vessels, &c.	27,000	
		373,205
Net Increase	£	5,461,000

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STATEMENT showing the Total Estimated EXPENDITURE for the NAVAL SERVICE, including Amounts provided in the NAVY ESTIMATES, as well as in the CIVIL SERVICE and other ESTIMATES, for the following Services :—

		1910–1911.	1909–1910.
		£	£
NAVY ESTIMATES:			
Estimated Expenditure (after deducting Appropriations in Aid) . .		40,603,700	35,142,700
CIVIL SERVICE ESTIMATES: (a)			
Estimated Expenditure under—			
Class I. Vote 9.—Public Buildings, Great Britain:	£		
Maintenance and Repairs, including New Works, Alterations, &c. .	26,360		
Rents, Insurance, Tithes, &c. . .	5,900		
Fuel, Light, Water, &c. . . .	6,500		
Furniture	7,500		
		46,260	56,200
Class I. Vote 10.—Surveys of the United Kingdom		2,660	3,450
„ I. „ 13.—Rates on Government Property		137,000	136,000
„ I. „ 14.—Public Works and Buildings, Ireland:			
Coast-guard, viz.:	£		
Purchase of Sites . . .	—		
New Works and Alterations, including Naval Reserve Stations . .	2,850		
Maintenance and Supplies . .	3,983		
Naval Reserve, viz.:			
Maintenance and Supplies . .	97		
		6,930	6,173
Class II. Vote 8.—Board of Trade:			
Staff and Incidental Expenses in connection with the Royal Naval Reserve Force . . .		3,736	3,993
„ II. „ 9.—Mercantile Marine Services:			
Staff and Incidental Expenses in connection with the Royal Naval Reserve Force . . .		2,500	2,850
„ II. „ 14.—Exchequer and Audit Department (Cost of Audit):	£		
Navy Cash Accounts . . .	9,046		
Expense and Manufacturing Accounts	5,646		
Store Accounts	5,911		
		20,603	20,962
Class II. Vote 23.—Stationery and Printing		101,000	102,000
„ III. „ 1.—Law Charges, England		10,842	10,824
Maintenance of Naval Prisoners:			
„ III. „ 8.—Prisons, England and the Colonies . . .		1,164	2,916
„ III. „ 14.—Prisons, Scotland		300	120
„ III. „ 21.—Prisons, Ireland		408	373
REVENUE DEPARTMENT ESTIMATES:			
Vote 1.—Customs.—Percentage for provision of funds for District Paymasters of the Coast-guard, &c		255	154
Vote 1.—Customs.—Staff and Incidental Expenses in connection with the Royal Naval Reserve Force		3,300	3,300
Vote 1.—Customs.—Analysis of Food, &c.		300	300
Vote 3.—Post Office.—Postage of Official Correspondence (including Parcels)	£24,700		
Vote 3.—Post Office Telegraphs.—Official Telegraphs and Expenses in connection with Telegraphs (Admiralty Wires, and Services of Clerks) . . .	11,000		
Vote 3.—Post Office Telephone Services	600		
		36,300	44,950
Total . . . . £		40,977,258	35,537,265

Note.—In addition to the Services shown above, an annuity of £16,243 18*s.* is payable to the Commissioners of Woods, &c., from the Consolidated Fund, under the Public Offices Sites Act of 1882 (45 & 46 Vict. c. 32).

(a) Provision is also made in the Estimate for Osborne for expenditure in connection with the treatment of invalid Officers of the Navy in the Convalescent Home at Osborne.

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STATEMENT showing the CONTRIBUTIONS from INDIA and the COLONIES towards NAVAL EXPENDITURE.

RECEIVED FROM.	NATURE OF SERVICE.	VOTE. 1	2	3	6	7	8 Section I.	8 Section II.	8 Section III.	9	11	12	13	14	15	TOTAL.
		£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
India	Maintenance of His Majesty's Ships in Indian Waters	28,000	9,100	500	..	..	12,500	10,200	13,000	11,600	2,500	..	4,300	8,300	..	100,000
India	Indian Troop Service (on account of work performed by the Admiralty)	..	..	..	..	..	..	..	..	..	..	3,050	..	..	350	3,400
Australian Commonwealth	Survey of the N.-W. coast of Australia	3,900	1,300	..	550	..	200	1,550	..	..	..	..	..	..	..	7,500
Australian Commonwealth	Maintenance of an Australasian Squadron and the establishment of a branch of the Royal Naval Reserve															200,000
Dominion of New Zealand	Maintenance of an Australasian Squadron and of the Imperial Navy generally, also for the establishment of a branch of the Royal Naval Reserve	72,500	22,900	700	..	6,300	..	38,400	118,700	6,900	8,700	..	10,600	14,300	..	100,000
Cape Colony	General maintenance of the Navy	10,200	4,200	..	..	..	4,500	8,400	13,000	5,700	..	..	..	..	..	46,000
Natal		7,700	3,200	..	..	..	3,400	6,400	9,900	4,400	..	..	..	..	..	35,000
Newfoundland	Maintenance of a branch of the Royal Naval Reserve	..	..	..	..	3,000	..	..	..	..	..	..	..	..	..	3,000
	Total £	122,300	40,700	1,200	550	9,300	20,600	64,950	154,600	28,600	11,200	3,050	14,900	22,600	350	494,900

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VOTE (A).

NUMBERS of OFFICERS, SEAMEN and BOYS, COAST-GUARD, and ROYAL MARINES Borne on the Books of His Majesty's Ships, and at the ROYAL MARINE DIVISIONS.

One Hundred and Thirty-one Thousand.
(131,000.*)

I.—SEA SERVICE.

Under which Vote Provided.	RANKS, &c.	NUMBERS, ALL RANKS. 1910–1911.		1909–1910.		Numbers of all Ranks borne on 1st January, 1910.
Vote 1	FOR HIS MAJESTY'S FLEET:					
	Flag Officers	27		28		
	Commissioned Officers	4,669		4,688		
	Subordinate Officers	668		615		
	Warrant Officers	1,819		1,762		
	Petty Officers and Seamen	94,784		91,978		
	Boys (Service)	2,149	104,116	1,794	100,865	101,385
	COAST-GUARD:					
	Commissioned Officers	103		103		
	Chief Officers and Second Mates.	222		230		
	Petty Officers and Seamen	2,795	3,120	2,934	3,267	3,248
	ROYAL MARINES (for Service Afloat and on Shore):					
	Commissioned Officers	449		457		
	Warrant Officers	44		45		
	Staff Sergeants and Sergeants	1,326		1,329		
	Band Ranks, Buglers and Musicians	1,674		1,607		
	Rank and File	13,468		13,915		
	Band Boys	224	17,185	250	17,608	17,452
	Total		124,421		121,735	122,085
	Net Increase		2,686			

* Average for the year.

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VOTE (A)—*continued.*

II.—OTHER SERVICES.

Under which Vote Provided.	RANKS, &c.	NUMBERS, ALL RANKS. 1910-1911.		1909-1910.		Numbers of all Ranks borne on 1st January, 1910.
Vote 1	Naval Cadets	790		784		
	Engineer Cadets	4		23		
	Pensioners in Home Ships, &c.	304		395		
	Boys under Training—					
	Seaman Class	3,295		2,860		
	Artificer Class	523		520		
			4,916		4,582	4,845
Vote 2	For Victualling and Clothing for the Navy	7		1		
Vote 3	For Medical Establishments and Services	585		567		
Vote 4	For Martial Law	14		17		
Vote 5	For Educational Services	564		558		
Vote 6	For Scientific Services	3		12		
Vote 7	For Royal Naval Reserves	59		58		
Vote 8	For Shipbuilding, Repairs, Maintenance, &c.:					
	Section I.	208		231		
	Section II.	29		29		
	Section III.	82		79		
Vote 9	For Naval Armaments	80		68		
Vote 12	For Admiralty Office	32		63		
			1,663		1,683	1,681
	Total		(c) 6,579		6,265	6,526
	Net Increase		314			
	Total, Sea Service	124,421		121,735		
	„ other Services	6,579		6,265		
			131,000		128,000	
	Net Increase		3,000			

(c) Including Officers, Seamen and Service Boys	2,273	..	2,330
„ Retired Officers and Pensioners	304	..	395
„ Boys (Training, Seaman Class)	3,295	..	2,860
„ Boys (Training, Artificer)	523	..	520
„ Boys (Training, Artisan)	45	..	44
„ Royal Marines	139	..	116
	6,579	..	6,265

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VOTE 8.

SHIPBUILDING, REPAIRS, MAINTENANCE, &c.

I.—ESTIMATE of the SUM which will be required, in the YEAR ending 31st March, 1911, to defray the EXPENSES of SHIPBUILDING, REPAIRS, MAINTENANCE, &c., including the COST of ESTABLISHMENTS of DOCKYARDS and NAVAL YARDS at HOME and ABROAD.

DOCKYARD WORK.

SECTION I.—PERSONNEL.—Three Million Four Hundred and Forty-four Thousand One Hundred Pounds.

(£3,444,100.)

SECTION II.—MATÉRIEL.—Four Million Six Hundred and Fourteen Thousand One Hundred Pounds.

(£4,614,100.)

CONTRACT WORK.

SECTION III.—CONTRACT WORK.—Twelve Million Three Hundred and Ninety-five Thousand Four Hundred Pounds.

(£12,395,400.)

(Total of the Three Sections of Vote 8 . . **£20,453,600.**)

II.—SUB-HEADS under which SECTION I., PERSONNEL, of this VOTE will be accounted for.

DOCKYARD WORK. SECTION I.—PERSONNEL.	ESTIMATES. 1910–1911.	1909–1910.	Increase.	Decrease.
Dockyards at Home.	£	£	£	£
A.—Salaries and Allowances . . .	(a) 240,181	235,562	4,619	..
B.—Wages, &c., of Men, and hire of Teams	2,618,745	2,342,368	276,377	..
C.—Wages, &c., of Police Force . .	54,375	51,676	2,699	..
D.—Contingencies	2,800	2,800	..	..
Naval Yards Abroad.				
E.—Salaries and Allowances . . .	(a) 108,444	106,777	1,667	..
F.—Wages, &c., of Men, and hire of Teams	418,769	409,075	9,694	..
G.—Wages, &c., of Police Force . .	21,786	20,892	894	..
H.—Contingencies	600	550	50	..
£	3,465,700	3,169,700	296,000	..
Deduct,—				
I.—Appropriations in Aid . . .	21,600	21,500	100	..
£	3,444,100	3,148,200	295,900	..
		Net Increase .	£295,900 (b)	

(a) These amounts include the sums of £37,876 for pay of Inspectors of Trades and Senior Draughtsmen at Home and £14,323 for pay of Inspectors of Trades Abroad, which is charged direct to the cost of shipbuilding, see Programme.

(b) This Vote is increased by a sum of £950 in respect of Dockyard Labour on Fixed Machinery originally provided for by advances under the Naval Works Acts, 1895 to 1905.

Note.—Provision has been made for New Construction in the above Vote to the extent of—

Section 1	£891,510
„ 2	670,290
„ 3	11,718,030
	£13,279,830

The difference (£115,125) between the provision under Section III. of the Vote (£11,718,030) and the amount shown in the Programme (£11,833,155) is due to the estimated withdrawals from Stock of transferable auxiliary machinery, gun mountings and steamboats during the year being more than the cash payments for like articles brought into Stock in the same period.

In addition to the Cash Vote of £4,614,100 under Section II., stocks of Naval Stores purchased in revious years will be drawn upon without replacement during 1910–1911 to the extent of £20,000.

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VOTE 8.—SHIPBUILDING, REPAIRS, MAINTENANCE, &c.—*continued.*

II.—SUB-HEADS under which SECTION II., MATÉRIEL, of this VOTE will be accounted for.

	ESTIMATES. 1910–1911.	ESTIMATES. 1909–1910.	Increase.	Decrease.
DOCKYARD WORK—*continued.*				
SECTION II.—MATÉRIEL.				
Naval Stores, &c.	£	£	£	£
A.—Timber, Masts, Deals, &c. . .	180,000	148,000	32,000	..
B.—Metals and Metal Articles . .	1,016,000	974,400	41,600	..
C.—Coal for Yard purposes . .	122,000	129,000	..	7,000
D.—Hemp, Canvas, &c. . . .	188,000	171,000	17,000	..
E.—Paint Materials, Oils, Pitch, Tar, Tallow, Boats, Furniture, and other Miscellaneous Articles .	736,100	719,000	17,100	..
F.—Electrical, Torpedo, and other Apparatus	484,000	460,200	23,800	..
G.—Freight	48,000	45,000	3,000	..
H.—Rents, Water, &c., Dockyards at Home, and Naval Yards Abroad	38,200	34,700	3,500	..
I.—Gas and Electric Current, Dockyards at Home and Naval Yards Abroad	15,900	16,500	..	600
£	2,828,200	2,697,800	138,000	7,600
Deduct,—				*Add,—*
J.—Appropriations in Aid. . .	502,100	333,000	..	169,100
£	2,326,100	2,364,800	138,000	176,700
Fuel, &c., for the Fleet.				
K. I.—Fuel, Lubricating Oils, &c., for the Fleet	1,991,000	1,748,300	242,700	..
K. II.—New Craft and Machinery for Coaling, &c.	127,000	120,000	7,000	..
K. III.—Salaries, Wages, and Allowances	125,000	125,000	..	..
K. IV.—Maintenance of Craft for Coaling, &c., and incidental expenses	86,000	74,000	12,000	..
£	2,329,000	2,067,300	261,700	..
Deduct,—				
L.—Appropriations in Aid . . .	41,000	40,000	1,000	..
£	2,288,000	2,027,300	260,700	..
£	4,614,100	4,392,100	398,700	176,700
	Net Increase . .		£222,000 (a)	

(a) This Vote is increased by a sum of £460 under Naval Stores, and of £2,000 in respect of Fixed Machinery originally provided for by advances under the Naval Works Acts, 1896 to 1905.

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VOTE 8.—SHIPBUILDING, REPAIRS, MAINTENANCE, &C.—*continued.*

II.—SUB-HEADS under which SECTION III., CONTRACT WORK, of this VOTE will be accounted for.

	ESTIMATES.		Increase.	Decrease.
	1910-1911.	1909-1910.		
SECTION III.—CONTRACT WORK.	£	£	£	£
A.—Propelling, &c., Machinery for His Majesty's Ships, Vessels, &c.	3,907,357	3,028,577	878,780	..
B.—Auxiliary Machinery, &c., for His Majesty's Ships, Vessels, &c.	115,000	170,968	..	55,968
C.—Hulls of Ships, &c., Building by Contract	3,602,008	1,954,922	1,647,086	..
D.—Armour for His Majesty's Ships and Vessels	2,755,133	997,164	1,757,969	..
E.—Repairs and Alterations by Contract of Ships, &c., and their Machinery and Stores	105,000	90,000	15,000	..
F.—Inspection of Contract Work	110,000	90,000	20,000	..
G.—Gun Mountings and Air-Compressing Machinery	1,541,002	1,646,739	..	105,737
H.—Machinery, &c., for His Majesty's Shore Establishments at Home and Abroad	235,000	225,000	10,000	..
H.H.—Fixed Machinery, formerly provided for by Advances under the Naval Works Acts, 1895 to 1905	30,000	50,000	..	20,000
I.—Royal Reserve of Merchant Cruisers.	150,000	150,000	..	..
K.—Purchase of Ships, Vessels, &c.	13,000	40,000	..	27,000
	£ 12,563,500	8,443,370	4,328,835	208,705
Deduct,—				
L.—Appropriations in Aid	168,100	165,070	3,030	..
	£ 12,395,400	8,278,300	4,325,805	208,705
		Net Increase		£4,117,100 (*a*)

(*a*) This Vote is increased by a sum of £30,000 in respect of Fixed Machinery originally provided for by advances under the Naval Works Acts, 1895 to 1905.

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VOTE 9.

NAVAL ARMAMENTS.

I.—ESTIMATE of the SUM which will be required in the Year ending 31st March, 1911, to defray the Expense of NAVAL ARMAMENTS.

Two Million Seven Hundred and Eighty-one Thousand Pounds.
(£2,781,000.)

II.—SUB-HEADS under which this Vote will be accounted for.

	ESTIMATES.		Increase.	Decrease.
	1910–1911.	1909–1910.		
NAVAL ORDNANCE, &c., ESTABLISHMENTS AT HOME AND ABROAD.	£	£	£	£
A.—Salaries and Allowances . .	46,529	44,503	2,026	..
B.—Wages of Artificers . . .	214,000	200,500	13,500	..
C.—Wages of Crews of Naval Ordnance Vessels . . .	12,200	12,700	..	500
D.—Wages, &c., of Police Force .	28,082	27,050	1,032	..
E.—Medical Attendance, Gas, Rents, Water, and Contingencies .	11,889	11,150	739	..
NAVAL ORDNANCE STORES.				
F.—Guns	1,003,300	711,000	292,300	..
G.—Projectiles and Ammunition .	800,000	770,000	30,000	..
H.—Torpedoes and Gun-cotton .	329,000	268,400	60,600	..
I.—Small Arms, Maintenance of Vessels, and Miscellaneous . .	235,000	243,000	..	8,000
K.—Inspection, Proof, Experiments, &c.	200,000	200,000	..	..
L.—Freight and Incidental Charges	26,000	32,697	..	6,697
£	2,906,000	2,521,000	400,197	15,197
Deduct,— M.—Appropriations in Aid . .	125,000	140,000	..	15,000
£	2,781,000	2,381,000	400,197	197
		Net Increase . .	£400,000	

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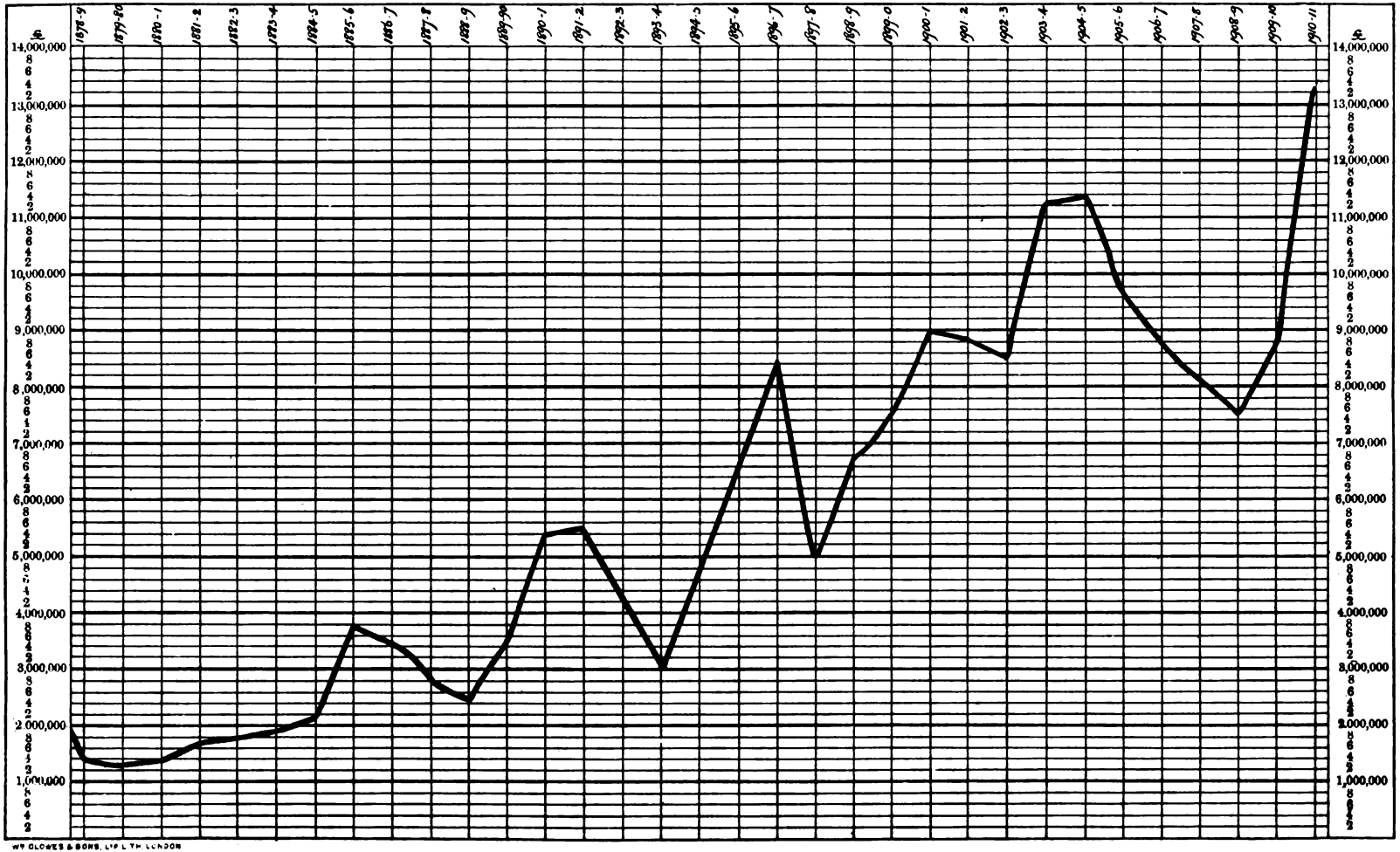
DIAGRAM SHEWING THE EXPENDITURE UPON THE CONSTRUCTION OF NEW SHIPS DURING THE 33 YEARS BETWEEN 1878–79 & 1910–11.



WM CLOWES & SONS, LIMITED, LONDON

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RECAPITULATION OF ESTIMATED EXPENDITURE.

SUB-HEADS OF EXPENDITURE.	Total Direct Expenditure.	Establishment, etc., Charges Apportioned.	New Construction.	Repairs, Alterations, etc.			Sea Stores, etc.	Establishment, Incidental, and Miscellaneous Charges Unappropriated.		Aggregate, 1910–11.
				Ships for Reliefs or Re-commission.	Ships in Commission and Reserve.	Other Naval Services.				
DOCKYARD WORK:	£	£	£	£	£	£	£	£	£	£
Section I.—*Personnel*.	2,397,658	1,218,594	1,027,886	469,533	1,138,386	84,453	58,242	529,027	308,725	3,616,252
Section II.—*Matériel*.	2,410,460	1,358,679	764,947	236,156	562,020	66,544	1,025,770	951,218	384,424	3,769,139
CONTRACT WORK:										
Section III. . .	12,130,855	617,109	12,018,312	19,378	242,444	39,930	..	205,960	..	12,747,964
Total Estimated Expenditure for 1910–1911	16,938,973	3,194,382	13,811,145	725,067	1,942,850	190,927	1,084,012	1,686,205	693,149	20,133,355
Totals of Sub-Heads £	**20,133,355**		**13,811,145**	**2,858,844**			1,084,012	**2,379,354**		**20,133,355**

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PROGRAMME of the ESTIMATED EXPENDITURE in CASH, and in NET MAINTENANCE, &c., in
(Exclusive of the FLEET
SUB-HEADS under which this ESTIMATED EXPENDITURE will be
provisions of Section 1 (2), ARMY

	ESTIMATED EXPENDITURE IN				
	Direct Expenditure.				
	Dockyard Work.		Contract Work, Sec. III.	Total Direct Expenditure. (▲)	
	Personnel, Sec. I.	Matériel, Sec. II.			
NEW CONSTRUCTION:	£	£	£	£	
A.—DOCKYARD-BUILT SHIPS—					
Hulls, &c. (*c*)	774,085	553,785	(*f*) 1,427,609	2,755,479	1
Machinery	45,295	23,290	919,308	987,893	2
	819,380	**577,075**	**2,346,917**	**3,743,372**	**3**
B.—CONTRACT-BUILT SHIPS—					
Hulls, &c. (*c*)	47,970	75,330	(*g*) 6,153,688	6,276,988	4
Machinery	..	..	2,871,935	2,871,935	5
	47,970	**75,330**	**9,025,623**	**9,148,923**	**6**
C.—OTHER VESSELS (*d*) . .	24,160	17,885	460,615	502,660	7
TOTAL NEW CONSTRUCTION	**891,510**	**670,290**	**11,833,155**	(*e*) **13,394,955**	**8**
D.—REPAIRS, ALTERATIONS, &c. .	1,506,148	743,040	297,700	2,546,888	9
E.—STORES, FOR MAINTENANCE, &c.	..	997,130	..	997,130	10
F.—ESTABLISHMENT, INCIDENTAL, AND MISCELLANEOUS CHARGES, UNAPPROPRIATED .	..	..	..	..	11
TOTAL . . £	**2,397,658**	**2,410,460**	**12,130,855**	**16,938,973**	**12**

(*c*) Including Hydraulic and Transferable Gun Mountings, &c.
(*d*) Including Harbour Craft, and excluding Torpedo Boats, &c., the value of which is included under other Sub-Heads.
(*e*) Exclusive of £11,000 provided under Vote 2 for new Lighters for Victualling Yard Service, £4,375 provided under Vote 9 for New Vessels for Naval Ordnance Store Service, £36,000 provided under Vote 10 for New Craft for Works Department, and £65,500 for Coaling Craft, Vote 8, Section 2, Sub-Head K.
(*f*) Including £829,080 for Armour. (*g*) Including £1,916,053 for Armour.

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VALUES OF STORES issued for SHIPBUILDING, REPAIRS, ALTERATIONS, the Year 1910–1911.
COALING SERVICE.)
accounted for in the NAVY EXPENSE ACCOUNTS, under the AND NAVY AUDIT ACT, 1889.

	1910–1911.		EXPENDITURE AS ESTIMATED IN NAVY ESTIMATES, 1909–1910.			Difference between Direct Expenditure, 1909–1910 (B) and 1910–1911 (A).	
	Establishment, &c., Charges, apportioned.	Aggregate, 1910–1911.	Direct Expenditure. (B)	Establishment, &c., Charges, apportioned.	Aggregate, 1909–1910.	Increase.	Decrease.
	£	£	£	£	£	£	£
1	224,218	2,979,697	(h) 2,707,297	224,101	2,931,398	48,182	..
2	25,065	1,012,958	980,048	29,455	1,009,503	7,845	..
3	**249,283**	**3,992,655**	**3,687,345**	**253,556**	**3,940,901**	**56,027**	..
4	109,312	6,386,300	(i) 2,874,277	66,517	2,940,794	3,402,711	..
5	44,938	2,916,873	2,029,752	42,748	2,072,500	842,183	..
6	**154,250**	**9,303,173**	**4,904,029**	**109,265**	**5,013,294**	**4,244,894**	..
7	12,657	515,317	200,579	10,292	210,871	302,081	..
8	**416,190**	**13,811,145**	**8,791,953**	**373,113**	**9,165,066**	**4,603,002**	..
9	311,956	2,858,844	2,573,662	316,435	2,890,097	..	26,774
10	86,882	1,084,012	933,400	84,530	1,017,930	63,730	..
	815,028			774,078			
11	2,379,354	2,379,354	..	2,408,912	2,408,912	..	..
12	**3,194,382**	**20,133,355**	**12,299,015**	**3,182,990**	**15,482,005**	..	..
	NET INCREASE ON DIRECT EXPENDITURE . . .						**£4,639,958**

(h) Including £609,000 for Armour.
(i) Including £378,164 for Armour.

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LIST of NEW SHIPS and VESSELS Estimated to be Passed into COMMISSION during the Years 1910–1911 and 1909–1910.

1910–1911.				1909–1910.			
NAME OF SHIP.	Load Displacement in Tons.	Estimated Horse Power.	Number of Guns.	NAME OF SHIP.	Load Displacement in Tons.	Estimated Horse Power.	Number of Guns.
ARMOURED SHIPS.				**ARMOURED SHIPS.**			
Neptune . . .	19,900	25,000	10	Vanguard . . .	19,250	24,500	10
Indefatigable . .	18,750	43,000	8	St. Vincent . . .	19,250	24,500	10
				Collingwood. . .	19,250	24,500	10
				Temeraire . . .	18,600	23,000	10
				Superb	18,600	23,000	10
UNARMOURED SHIPS.							
Blanche	3,360	18,000	10				
Bristol	4,800	22,000	12				
Glasgow	4,800	22,000	12	**UNARMOURED SHIPS.**			
Gloucester . . .	4,800	22,000	12				
Liverpool . . .	4,800	22,000	12	Boadicea	3,300	18,000	6
Newcastle . . .	4,800	22,000	12	Bellona	3,360	18,000	6
TORPEDO CRAFT.				**TORPEDO CRAFT.**			
TORPEDO BOAT DESTROYERS . } 20	..	Various	..	Swift.	1,800 (estimated)	30,000	4
				TORPEDO BOAT DESTROYERS . } 9	..	Various	..
SUBMARINE BOATS 4	..	..	..				
				FIRST-CLASS TORPEDO BOATS . } 6	..	Various	2 (each)
				SUBMARINE BOATS 17	..	..	..

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SUPPLEMENTARY NAVY ESTIMATE.

THE following Estimate of further sums required to be voted for the Navy for the year ending March 31, 1910, was issued on February 25 as a Parliamentary paper [28]:—

I.—Estimate of the further amount required during the year ending March 31, 1910, beyond the sum already provided in the Grant for Navy Services for the Year.

Six Hundred and Eighty-Nine Thousand One Hundred Pounds (£689,100).

II.—Votes and Sub-Heads of the Navy Estimates under which this Vote will be accounted for by the Admiralty.

	£	£
VOTE 8.—SHIPBUILDING, REPAIRS, MAINTENANCE, &c.—		
Section III.—Contract Work:—		
A.—Propelling, &c., Machinery for Ships	310,000	
(Revised Estimate, £3,338,577.)		
C.—Hulls of Ships, &c.	185,000	
(Revised Estimate, £2,139,922.)		
D.—Armour for Ships	160,000	
(Revised Estimate, £1,157,164.)		
G.—Gun Mountings, &c.	208,000	
(Revised Estimate, £1,854,739.)		
	863,000	
Less—Surplus on Sub-Head B	33,000	
(Revised Estimate, £137,968.)		830,000
VOTE 9.—NAVAL ARMAMENTS:—		
F.—Guns	108,000	
(Revised Estimate, £819,000.)		
H.—Torpedoes and Gun Cotton	28,000	
(Revised Estimate, £296,400.)		
M.—Appropriations in Aid—*Add*	20,000	
(Revised Estimate, £120,000.)		
	156,000	
Less—Surpluses on other Sub-Heads, viz:—		
G.—£59,000; L.—£11,000	70,000	
(Revised Estimates, G.—£711,000; L.—£21,697.)		86,000
VOTE 10.—WORKS, BUILDINGS, AND REPAIRS, &c.:—		
Part I. B.—New Works, &c.:—		
Plymouth (Dockyard)—"Increased facilities for Docking Destroyers" 5,000		
(Total Estimated Cost, £45,200.)		
M.—Stores, &c.:—		
New Suction Dredger 34,000		
(Total Estimated Cost, £70,000.)	39,000	
(Revised Estimate, £44,000.)		
Less—Surplus on other services included in Sub-Head B .	38,900	
		100
		916,100
Less—Other Surpluses:—		
VOTE 1.—Wages, &c., of Officers, Seamen, and Boys, &c.:—		
A.—Wages, &c.	50,000	
(Revised Estimate, £6,353,121.)		
VOTE 10.—Works, Buildings, and Repairs, &c.:—		
Part I. B.—New Works, &c.	177,000	
(Revised Estimate, £993,520.)		227,000
TOTAL OF SUPPLEMENTARY ESTIMATE		£689,100

T. J. MACNAMARA, *Secretary.*

Admiralty, *February* 22.

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1909–1910.

Statement showing the Sums already Voted, the Supplementary or Revised Sums required under each Vote, and the Revised Total for the Year.

—	Gross Total.	Appropriations in Aid.	Net Total.
VOTE 1.	£	£	£
Original Estimate	7,432,949	152,749	7,280,200
Supplementary Estimate now presented	*Abate* 50,000	—	50,000
Revised Estimate	7,382,949	152,749	7,230,200
VOTE 8.—SECTION III.			
Original Estimate	8,443,370	165,070	8,278,300
Supplementary Estimate now presented	830,000	—	830,000
Revised Estimate	9,273,370	165,070	9,108,300
VOTE 9.			
Original Estimate	2,521,000	140,000	2,381,000
Supplementary Estimate now presented	66,000	*Abate* 20,000	86,000
Revised Estimate	2,587,000	120,000	2,467,000
VOTE 10.			
Original Estimate	2,950,300	34,000	2,916,300
Supplementary Estimate now presented	*Abate* 176,900	—	176,900
Revised Estimate	2,773,400	34,000	2,739,400
TOTAL NAVY ESTIMATES.			
Original Estimates	36,782,990	1,640,290	35,142,700
Supplementary Estimates now presented	669,100	*Abate* 20,000	689,100
Revised Total	37,452,090	1,620,290	35,831,800

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Result of Test of Gunlayers with Heavy Guns in His Majesty's Fleet, 1909.

		1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.
Number of ships that fired		121	127	139	134	108	100	89	121	117	116
Number of guns or turrets		1,031	1,137	1,241	1,296	1,171	1,096	1,073	1,365	1,277	1,312
Number of hits	1906 target	2,732	3,562	4,789	5,996	5,748	4,374	5,733	7,547	..	..
	1907 ,,	..	..	..	..	..	..	..	4,073	4,826	5,108
Number of misses	1906 ,,	5,709	6,244	6,863	7,028	7,664	3,357	2,328	1,991	..	..
	1907 ,,	..	..	..	..	..	..	..	5,465	4,183	4,330
Excess of hits over misses	1906 ,,	Nil	Nil	Nil	Nil	Nil	1,017	3,405	5,556	..	..
	1907 ,,	..	..	..	..	..	..	..	Nil	643	778
Excess of misses over hits	1906 ,,	2,977	2,682	2,074	1,032	1,916	Nil	Nil	Nil	..	..
	1907 ,,	..	..	..	..	..	..	..	1,392	Nil	Nil
Percentage of hits to rounds fired	1906 ,,	32·3	36·3	41·1	46·04	42·86	56·58	71·12	79·13	..	..
	1907 ,,	..	..	..	..	..	..	..	42·70	53·57	54·12
Hits per gun per minute—											
12″ and 10″	1906 target	·30	·33	·38	·53	·47	·58	·81	·61	..	..
	1907 ,,	..	..	..	..	..	..	..	·40	·56	·63
9·2″	1906 ,,	·22	·31	·35	·70	·73	1·40	2·84	3·25	..	..
	1907 ,,	..	..	..	..	..	..	..	2·01	2·20	1·94
7·5″	1906 ,,	..	..	..	..	..	..	..	3·48	..	..
	1907 ,,	..	..	..	..	..	..	..	1·58	2·51	2·47
6″ B.L. and Q.F.	1906 ,,	1·51	1·81	2·41	2·63	2·63	4·14	5·63	5·93	..	..
	1907 ,,	..	..	..	..	..	..	..	3·32	3·93	4·03
4·7″ Q.F. and 4″ B.L. and Q.F.	1906 ,,	1·60	1·93	2·02	2·47	2·23	3·73	4·96	5·73	..	..
	1907 ,,	..	..	..	..	..	..	..	2·38	3·32	4·06
Number of ships from whom no returns were received.		29	47	19	30	43	Nil	Nil	3	8	10

Abstract, 1909.

Order of Merit.	Fleet or Squadron.	No. of Ships.	No. of Men Firing.	Points per Gun or Turret.	First Ship in Fleet.	Scores.
1	China	5	64	68·691	King Alfred	79·21
2	Home Fleet, Third Division, and Third Cruiser Squadron	26	291	49·872	Illustrious	64·27
3	Home Fleet, Second Division, and Second Cruiser Squadron	15	208	48·613	Natal	89·44
4	Atlantic Fleet and Fifth Cruiser Squadron	12	170	47·182	Albemarle	65·36
5	Mediterranean Fleet and Sixth Cruiser Squadron	14	186	43·810	Medea	61·34
6	Cape of Good Hope	3	29	41·984	Hermes	48·65
7	Australia	7	72	40·912	Encounter	62·06
8	Special Service, Tenders, &c.	13	63	40·702	Bramble	62·37
9	Home Fleet, First Division, and First Cruiser Squadron	16	186	37·188	Superb / Temeraire	71·21
10	Fourth Cruiser Squadron	3	24	33·554	Scylla	38·72
11	East Indies	2	19	31·720	Hyacinth	44·48
	Total, 1909 Test	116	1,312	46·098		
	Total, 1908 Test	117	1,277	45·775		
	Difference	1	+35	+0·323		

Note.—The 4-in. guns of Bellerophon and Invincible classes are not included in this Abstract.

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Results of Test of Gunlayers with Heavy Guns.

Order of Merit.	Ship.	Whether 1st or 2nd Firing.	Points.	No. of Men Firing.	Guns.	Rounds.	Hits.	Per Minute.		Points per Gun or Turret.	Best Shot in Ship.	Hits made by Best Shot.	Comparison with 1908 Results.	
								Rounds.	Hits.				Hits, 1908.	Hits, 1909.
1	Natal	2nd	89·44	6	9·2″ Mark X.	53	44	4·42	3·67	86·24	H. Fincken, P.O. (1)	10	31	44
				4	7·5″ B.L.	43	38	6·14	5·43	94·24	G. Eaton, P.O. (1)	12	17	38
2	King Alfred	2nd	79·21	2	9·2″ Mark X.	19	14	4·75	3·50	82·32	A. James, C.P.O.	8	12	14
				16	6″ B.L. VII. (*b*)	152	109	9·50	6·81	78·82	R. Scutchings, Gnr., R.M.A.	11	93	109
3	Bedford	1st	71·35	12	6″ B.L. VII. (*b*)	112	74	9·33	6·17	71·35	F. Tree, P.O. (1)	9	..	74
4	Superb	1st	71·21	10	12″ Mark X.	51	36	3·71	2·62	71·21	H. Osenton, P.O. (1)	5	..	36
	Temeraire	1st	71·21	10	12″ Mark X.	43	36	3·13	2·62	71·21	W. Higman, P.O.	6	..	36
6	Dreadnought	1st	67·25	10	12″ Mark X.	47	34	3·42	2·47	67·25	E. Diaper, L.S.	5	..	34
7	Monmouth	2nd	66·53	12	6″ B.L. VII. (*b*)	95	69	7·02	5·75	66·53	J. Williams, L.S.	10	55	69
8	Albemarle	2nd	65·36	3	12″ Mark IX.	14	5	2·55	0·91	29·40	H. Harper, C.P.O.	2	5	5
				12	6″ B.L. VII. (*b*)	102	74	8·50	6·17	71·35	W. Lincoln, P.O. (2)	8	36	74
9	Kent	2nd	64·60	12	6″ B.L. VII. (*b*)	118	67	9·83	5·58	64·60	J. Curnow, P.O. (2)	9	63	67
10	Illustrious	1st	64·27	4	12″ Mark VIII.	13	5	2·36	0·91	29·40	W. Kent, P.O. (1)	2	..	5
				12	6″ Q.F.	78	55	6·50	4·58	70·08	W. Mulrooney, P.O. (1)	7	..	55
11	Victorious	1st	63·28	4	12″ Mark VIII.	11	3	2·00	0·55	14·84	R. Chantry, P.O. (1)	2	..	3
				12	6″ Q.F.	74	56	6·17	4·67	71·35	F. Ford, L.S.	8	..	56
12	Mars (New Commission)	1st	63·26	4	12″ Mark VIII.	14	9	2·55	1·64	52·92	E. Hardy, C.P.O.	4	..	9
				12	6″ Q.F.	80	51	6·67	4·25	64·98	T. Storey, Lce.-Sgt., R.M.A.	7	..	51
13	Magnificent	1st	62·44	4	12″ Mark VIII.	15	8	2·73	1·45	39·56	H. Moore, P.O. (1)	3	..	8
				12	6″ Q.F.	71	52	5·92	4·33	66·26	G. Lyne, Sgt., R.M.A.	6	..	52
14	Bramble	2nd	62·37	2	4″ Q.F.	18	11	12·00	7·33	62·37	W. Archer, A.B.	6	6	11

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15	Encounter . . .	2nd	62·06	11	6″ B.L. VII. (*b*)	91	59	8·27	5·36	62·06	A. Woolmer, A.B. . .	8	37	59
16	Black Prince . .	2nd	62·01	6	9·2″ Mark X. .	46	37	3·83	3·08	72·52	J. Palmer, P.O. (1) .	8	26	37
				10	6″ B.L. XI. .	77	44	7·70	4·40	55·70	W. Horton, C.P.O. .	7	44	44
17	Medea	1st	61·34	6	4·7″ Q.F. . .	49	29	8·17	4·83	61·34	E. Jones, L.S. . . .	9	..	29
18	Sutlej	1st	61·28	2	9·2″ B.L. X. .	17	9	4·25	2·25	52·92	F. Harrison, L.S. . .	5	..	9
				12	6″ B.L. VII. (*b*)	90	65	7·50	5·42	62·67	J. Blanchard, Gnr., R.M.A.	10	..	65
19	Canopus . . .	2nd	59·90	4	12″ B.L. VIII.	15	5	2·73	0·91	29·40	W. Thompson, P.O. (1)	2	9	5
				12	6″ Q.F. . .	75	51	6·25	4·25	64·98	G. Godden, Sgt., R.M.A.	7	57	51
20	Russell . . .	2nd	57·93	4	12″ Mark IX. .	17	6	3·09	1·09	35·28	W. Spratt, C.P.O. . .	3	5	6
				12	6″ B.L. VII. (*b*)	100	64	8·33	5·33	61·71	G. King, Gnr., R.M.A.	9	52	64
21	Exmouth . . .	1st	57·11	4	12″ Mark IX. .	16	6	2·91	1·09	35·28	L. High, A.B. . . .	2	..	6
				12	6″ B.L. VII. (*b*)	98	63	8·17	5·25	60·74	C. Bullbeck, P.O. (1) .	9	..	63
22	Cumberland . .	2nd	56·89	12	6″ B.L. VII. & VIII. (*b*)	103	59	8·58	4·92	56·89	G. March, Pte., R.M.L.I.	9	46	59
23	Venus	2nd	56·80	11	6″ B.L. VII. (*b*)	97	54	8·82	4·91	56·80	G. Goss, A.B. . . .	8	43	54
24	Dominion . . .	2nd	56·46	4	12″ Mark IX. .	18	8	3·27	1·45	39·56	E. Nash, C.P.O. . .	3	14	8
				4	9·2″ Mark X. .	26	14	3·25	1·75	41·16	J. Stevens, P.O. (2) .	4	11	14
				10	6″ B.L. VII. (*a*)	85	57	8·50	5·70	65·95	F. Harding, L.S. . .	9	25	57
25	Drake	1st	56·01	2	9·2″ Mark X. .	13	8	3·25	2·00	47·04	W. Persse, P.O. (1) .	6	..	8
				16	6″ B.L. VII. (*b*)	119	79	7·44	4·94	57·13	E.Spencer, Cpl., R.M.A.	8	..	79
26	Ocean	2nd	55·78	4	12″ B.L. VIII.	13	4	2·36	0·73	23·52	C. White, L.S. . . .	2	2	4
				12	6″ Q.F. . . .	80	48	6·67	4·00	61·16	J. Hurdon, P.O. (1) .	6	44	48
27	Doris	1st	55·75	11	6″ B.L. VII. .	90	53	8·18	4·82	55·75	T. Stevens, A.B. . .	9	..	53
	Challenger . .	1st	55·75	11	6″ B.L. Mark VII. (*b*) . .	87	53	7·91	4·82	55·75	S. Worth, L.S. . . .	7	..	53
29	Warrior . . .	1st	55·56	6	9·2″ Mark X. .	45	27	3·75	2·25	52·92	T. Addy, Bom., R.M.A.	7	..	27
				4	7·5″ B.L. . .	39	24	5·57	3·43	59·52	F. Spackman, A.B. .	9	..	24
30	Hannibal . . .	1st	54·94	4	12″ B.L. VIII.	14	3	2·55	0·55	17·64	R. Pulvertaft, C.P.O. .	1	..	3
				12	6″ Q.F. . . .	70	48	5·83	4·00	61·16	J. Johnston, Sgt., R.M.L.I.	7	..	48
31	Cressy	1st	54·63	2	9·2″ B.L. X. .	14	6	3·50	1·50	35·28	G. Epsley, C.P.O. . .	3	..	6
				12	6″ B.L. VII. (*b*)	92	60	7·67	5·00	57·85	W. Cooper, L.S. . .	8	..	60
32	Astræa	1st	54·08	2	6″ Q.F. . .	12	3	6·00	1·50	22·94	S. Mann, P.O. (1) . .	2	..	3
				8	4·7″ Q.F. . .	68	39	8·50	4·88	61·86	G. Tucker, Pte., R.M.L.I.	7	..	39

(*a*) = full or ⅔ charges. (*b*) = ½ charges.

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RESULTS OF TEST OF GUNLAYERS WITH HEAVY GUNS—*continued.*

Order of Merit.	Ship.	Whether 1st or 2nd Firing.	Points.	No. of Men Firing.	Guns.	Rounds.	Hits	Per Minute.		Points per Gun or Turret.	Best Shot in Ship.	Hits made by Best Shot.	Comparison with 1908 Results.	
								Rounds.	Hits.				Hits, 1908.	Hits, 1909.
33	Euryalus	1st	53·87	2	9·2″ Mark X.	14	11	3·50	2·75	64·68	J. Connelly, P.O. (1)	6	..	11
				12	6″ B.L. VII. (*b*)	86	54	7·17	4·50	52·07	W. Lapish, P.O. (1)	7	..	54
34	Cochrane	1st	53·69	6	9·2″ Mark X.	47	33	3·92	2·75	64·68	I. Turner, P.O. (2)	7	..	33
				4	7·5″ B.L.	36	15	5·14	2·14	37·20	J. Wand, P.O. (2)	5	..	15
35	Cæsar	2nd	52·76	4	12″ Mark VIII.	12	3	2·18	1·55	17·64	A. Hermitage, L.S.	2	..	3
				12	6″ Q.F.	74	46	6·17	3·83	58·61	H. Dovey, A.B.	8	31	46
36	King Edward VII.	1st	52·26	4	12″ Mark IX.	18	8	3·27	1·45	39·56	G. Sharpe, P.O. (1)	2	..	8
				4	9·2″ Mark X.	36	26	4·50	3·25	76·44	J. Painter, C.P.O.	8	..	26
				10	6″ B.L. VII. (*a*)	75	39	7·50	3·90	45·12	J. Hallett, L.S.	8	..	29
37	Arrogant	2nd	51·99	10	6″ Q.F.	66	34	6·60	3·40	51·99	W. Palk, Lance.-Sgt., R.M.L.I.	5	20	34
38	Defence	1st	51·78	4	9·2″ Mark XI.	19	9	4·75	2·25	42·84	J. Davies, Gnr., R.M.A.	4	..	9
				10	7·5″ B.L.	94	54	5·37	3·09	53·57	W. Vigus, P.O. (1)	9	..	54
39	Jupiter	1st	51·75	4	12″ Mark VIII.	14	7	2·55	1·27	41·16	F. Roberts, P.O. (1)	2	..	7
				12	6″ Q.F.	77	42	6·42	3·50	53·52	S. Casswell, Cpl., R.M.A.	7	..	42
40	Hibernia	1st	51·10	4	12″ Mark IX.	13	4	2·36	0·73	23·52	.. ..	1	..	4
				4	9·2″ Mark X.	27	16	3·38	2·00	47·04	J. Sandback, L.S.	6	..	16
				10	6″ B.L. XI.	66	46	6·60	4·60	58·24	T. Walsh, Sgt., R.M.A.	7	..	46
41	Majestic	1st	50·91	4	12″ Mark VIII.	14	6	2·55	1·09	35·28	G. Steer, C.P.O.	2	..	6
				12	6″ Q.F.	70	42	5·83	3·50	53·52	J. Easterbrook, P.O. (1)	6	..	42
42	Spanker	1st	50·76	2	4·7″ Q.F.	15	8	7·50	4·00	50·76	C. Ware, P.O. (1)	8	..	8
43	Diana	1st	50·49	11	6″ B.L. VII. (*b*)	80	48	7·27	4·36	50·49	T. Murphy, P.O. (1)	7	..	48
44	Britannia	1st	50·29	4	12″ Mark IX.	12	3	2·18	0·55	14·84	G. Fisher, C.P.O.	2	..	3
				4	9·2″ Mark X.	21	11	2·63	1·38	32·34	A. Hinton, P.O. (1)	5	..	11
				10	6″ B.L. XI.	79	51	7·90	5·10	64·57	W. Duffett, A.B.	8	..	51
45	Duncan	2nd	48·83	4	12″ Mark IX.	16	5	2·91	0·91	29·40	G. Freeman, P.O. (1)	2	8	5
				12	6″ B.L. VII. (*b*)	88	54	7·33	4·50	52·07	E. Chorley, Bomb., R.M.A.	7	52	54

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46	Hermes	1st	48·65	11	6″ Q.F.	70	35	6·36	3·18	48·65	H. Greenhill, P.O. (1).	5	..	35
				4	12″ Mark X.	19	9	3·45	1·64	44·51	W. Eley, P.O. (1)	3	2	9
47	Agamemnon	2nd	48·44	8	9·2″ Mark XI.	35	19	4·38	2·38	45·22	G. Quick, A.B.	4	23	19
				2	9·2″ Mark XI.	14	10	3·50	2·50	58·80	F. Tunnicliffe, Gnr., R.M.A.	6	7	10
48	Minotaur	2nd	48·37	4	9·2″ Mark XI.	17	12	4·25	3·00	57·12	H. Jones, P.O. (1)	4	10	12
				10	7·5″ B.L.	97	47	5·54	2·69	46·62	T. Cathie, Sgt., R.M.A.	8	45	47
49	Carnarvon	1st	48·10	4	7·5″ B.L.	33	17	4·71	2·43	42·16	W. Wheeler, L.S.	8	..	17
				6	6″ B.L. VII. (*a*)	40	27	6·67	4·50	52·07	C. Kershaw, Pte., R.M.L.I.	6	..	27
50	Furious	1st	47·40	10	6″ Q.F.	58	31	5·80	3·10	47·40	G. Stevenson, L.S.	6	..	31
51	Dido	1st	47·33	11	6″ B.L. VII. (*b*)	75	45	6·82	4·09	47·33	C. Andriolie, P.O. (1)	6	..	45
52	Lancaster	2nd	47·24	12	6″ B.L. VII. (*b*)	82	49	6·83	4·08	47·24	G. Mayo, Lce.-Sgt., R.M.L.I.	6	39	49
53	Bacchante	2nd	47·17	2	9·2″ B.L. X.	8	5	2·00	1·25	29·40	A. Stewart, P.O. (1)	3	5	5
				12	6″ B.L. VII. (*b*)	76	52	6·33	4·33	50·14	E. Goodyear, Bomb., R.M.A.	9	31	52
54	Suffolk	2nd	46·28	12	6″ B.L. VII. (*b*)	86	48	7·17	4·00	46·28	T. Hallam, Pte., R.M.L.I.	8	31	48
55	Duke of Edinburgh	2nd	46·01	6	9·2″ Mark X.	44	26	3·67	2·17	50·96	O. F. Mortimer, C.P.O.	6	18	26
				10	6″ B.L. XI.	69	34	6·90	3·40	43·04	C. Barnes, P.O. (2)	5	25	34
				4	12″ Mark IX.	19	7	3·45	1·27	34·62	W. Chandler, C.P.O.	4	..	7
56	Africa	1st	45·99	4	9·2″ Mark X.	31	19	3·88	2·38	55·86	T. Staines, L.S.	7	..	19
				10	6″ B.L. XI.	69	35	6·90	3·50	44·31	W. Hurn, Gnr., R.M.A.	7	..	35
57	Vindictive	2nd	45·87	10	6″ Q.F.	56	30	5·60	3·00	45·87	A. Warden, A.B.	6	35	30
58	Bulwark	1st	45·54	4	12″ Mark IX.	12	6	2·18	1·09	35·28	W. Milford, C.P.O.	2	..	6
				10	6″ B.L. VII. (*b*)	83	49	6·92	4·08	47·24	C. Williams, P.O. (1)	8	..	49
59	Achilles	1st	45·53	6	9·2″ Mark X.	47	21	3·92	1·75	41·16	A. Bailey, P.O. (1)	6	..	21
				4	7·5″ B.L.	34	21	4·86	3·00	52·08	P. Archdeacon, A.B.	9	..	21
60	Britomart	1st	45·36	2	4″ Q.F.	17	8	11·33	5·33	45·36	J. Neish, A.B.	4	..	8
61	Talbot	1st	45·23	11	6″ B.L. VII. (*b*)	80	43	7·27	3·91	45·23	C. Long, P.O. (2)	7	..	43
62	Hyacinth	1st	44·48	11	6″ Q.F.	60	32	5·45	2·91	44·48	A. Alexander, P.O. (1).	5	..	32
63	Argyll	2nd	44·47	4	7·5″ B.L.	39	25	5·57	3·57	62·00	T. Hill, P.O. (1)	8	8	25
				6	6″ B.L. VIII. (*a*)	43	17	7·17	2·83	32·78	C. Perry, Pte., R.M.L.I.	5	27	17
64	Juno	1st	44·18	11	6″ B.L. VII. (*b*)	82	42	7·45	3·82	44·18	J. Whittington, L.S.	8	..	42
65	Bellerophon	1st	43·52	10	12″ Mark IX.	39	22	2·84	1·60	43·52	T. Gafford, C.P.O.	4	..	22

(*a*) = full or ¾ charges. (*b*) = ½ charges.

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Results of Test of Gunlayers with Heavy Guns—*continued.*

Order of Merit.	Ship.	Whether 1st or 2nd Firing.	Points.	No. of Men Firing.	Guns.	Rounds.	Hits.	Per Minute.		Points per Gun or Turret.	Best Shot in Ship.	Hits made by Best Shot.	Comparison with 1908 Results.	
								Rounds.	Hits.				Hits, 1908.	Hits, 1909.
66	Antrim	1st	43·31	4	7·5″ B.L.	37	18	5·29	2·57	44·64	R. Read, A.B.	9	..	18
				6	6″ B.L. VII. (*a*)	37	22	6·17	3·67	42·42	B. Tapply, A.B.	6	..	22
67	Psyche	2nd	42·53	8	4″ Q.F. Mark III.	61	30	10·17	5·00	42·53	W. Bedford, L.S.	6	7	30
68	Devonshire	2nd	41·49	4	7·5″ B.L.	30	15	4·29	2·14	37·20	Z. Rees, P.O. (1)	7	15	15
				4	6″ B.L. VII. (*a*)	43	23	7·17	3·83	44·35	A. Stowell, Lce.-Corp., R.M.L.I.	5	22	23
69	Mars	1st	41·00	3	12″ B.L. Mark VIII.	13	2	2·36	0·36	11·76	H. Foreman, P.O. (N.S.)	1	..	2
				12	6″ Q.F.	76	36	6·33	3·00	45·87	H. Dickinson, Pte., R.M.L.I.	7	..	36
70	Forte	1st	39·89	2	6″ Q.F.	15	7	7·50	3·50	53·52	R. Marchant, A.B.	4	..	7
				8	4·7″ Q.F.	63	23	7·88	2·88	36·48	A. Brown, A.B.	6	..	23
	Charybdis	1st	39·89	2	6″ Q.F.	12	7	6·00	3·50	53·52	A. Fagence, P.O. (1)	4	..	7
				8	4·7″ Q.F.	49	23	6·13	2·88	36·48	J. Harwood, A.B.	5	..	23
71a	Cadmus	—	39·69	6	4″ Q.F.	38	21	8·44	4·67	39·69	D. Brown, A.B.	6	..	6
72	Hampshire	1st	39·67	4	7·5″ B.L.	39	12	5·57	1·71	29·76	T. Brown, P.O. (1)	5	..	12
				6	6″ B.L. VII. (*b*)	45	24	7·50	4·00	46·28	S. Bible, C.P.O.	8	..	24
73	Indomitable	2nd	39·56	8	12″ Mark X.	40	16	3·64	1·45	39·56	W. Rann, Bom., R.M.A.	5	23	16
74	New Zealand	1st	39·23	2	12″ Mark IX.	22	3	4·00	0·55	17·64	W. Power, P.O. (1)	2	..	3
				4	9·2″ Mark X.	27	12	3·38	1·50	35·28	J. Sullivan, P.O. (1)	5	..	12
				10	6″ B.L. VII. (*a*)	74	39	7·40	3·90	45·12	W. Richards, Sergt. R.M.A.	6	..	39
75	Scylla	1st	38·72	2	6″ Q.F.	8	2	4·00	1·00	15·29	J. Adams, L.S.	1	..	2
				6	4·7″ Q.F.	40	22	6·67	3·67	46·53	A. Collison, P.O. (1)	5	..	22
76	Seagull	1st	38·07	2	4·7″ Q.F.	17	6	8·50	3·00	38·07	E. Belcher, C.P.O.	4	..	6
	Skipjack	1st	38·07	2	4·7″ Q.F.	12	6	6·00	3·00	38·07	G. Venning, L.S.	4	..	6

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78	Minerva . . .	1st	37·87	11	6″ B.L. VII. (*b*)	74	36	6·73	3·27	37·87	A. West, A.B. . . .	7	..	36
79	Bonaventure . .	1st	37·50	2	6″ Q.F. . . .	12	8	6·00	4·00	61·16	H. Carter, Corp., R.M.L.I.	4	..	8
				6	4·7″ Q.F. . .	46	14	7·67	2·33	29·61	A. Humphries, A.B. .	4	..	14
80	Eclipse	1st	37·21	5	6″ Q.F. . . .	28	11	5·60	2·20	33·64	G. York, P.O. (2) . .	3	..	11
				6	4·7″ Q.F. . .	43	19	7·17	3·17	40·19	H. Sayer, P.O. (1) . .	6	..	19
81	Shannon . . .	2nd	36·97	4	9·2″ Mark XI.	21	7	5·25	1·75	33·32	J. Brownlee, P.O. (1) .	3	4	7
				10	7·5″ Mark V. .	87	38	4·97	2·17	37·70	W. Collings, P.O. (1) .	8	46	38
82	Algerine . . .	2nd	36·86	4	4″ Q.F. . . .	31	13	10·33	4·33	36·86	J. Singer, P.O. (2) . .	5	11	13
83	Powerful . . .	2nd	36·22	2	9·2″ Mark VIII.	5	1	1·25	0·25	12·50	W. Bushell, P.O. (1) .	1	2	1
				16	6″ Q.F. . . .	91	41	5·69	2·56	39·18	H. Doel, L.S. . . .	6	43	41
84	Pandora . . .	1st	35·44	8	4″ Q.F. . . .	57	25	9·50	4·17	35·44	E. Vye, Lce.-Corp., R.M.L.I.	5	..	25
85	Clio	1st	34·02	6	4″ Q.F. . . .	47	18	10·44	4·00	34·02	W. Duke, L.S. . . .	6	..	18
86	Indefatigable . .	1st	33·68	2	6″ Q.F. . . .	12	6	6·00	3·00	45·87	R. Kelly, P.O. (1) . .	3	..	6
				6	4·7″ Q.F. . .	36	14	6·00	2·33	29·61	H. Jeffries, Clr.-Sgt., R.M.L.I.	6	..	14
87	Aboukir . . .	1st	33·13	2	9·2″ Mark X. .	11	5	2·75	1·25	29·40	C. Rogers, L.S. . . .	3	..	5
				12	6″ B.L. VII. (*b*)	87	35	7·25	2·92	33·75	J. Lyne, P.O. (2) . .	7	..	35
88	Cornwallis . . .	2nd	33·08	2	12″ Mark IX. .	11	2	2·00	0·36	11·76	C. Nethercott, L.S. .	1	1	2
				12	6″ B.L. VII. (*b*)	92	38	7·67	3·17	36·64	J. Borrett, A.B. . .	7	36	38
89	Triumph . . .	1st	32·79	4	10″ B.L. . .	10	2	2·50	0·50	14·29	P. Gilroy, P.O. (1) . .	1	..	2
				14	7·5″ B.L. . .	109	50	4·45	2·04	35·43	D. Hutchinson, A.B. .	5	..	50
90	Jason	1st	31·73	2	4·7″ Q.F. . .	11	5	5·50	2·50	31·73	A. Thomas, C.P.O. .	3	..	5
91	Queen	1st	31·51	4	12″ Mark IX. .	19	8	3·45	1·45	47·04	W. Malpas, P.O. (1) .	4	..	8
				12	6″ B.L. VII. (*b*)	77	30	6·42	2·50	28·93	J. Kerslake, L.S. . .	6	..	30
92	Irresistible . .	1st	31·49	4	12″ Mark IX. .	16	6	2·91	1·09	35·28	R. Lutman, C.P.O. .	2	..	6
				12	6″ B.L. VII. (*b*)	81	32	6·75	2·67	30·85	W. Blundell, A.B. . .	5	..	32
93	Prince of Wales .	1st	29·78	4	12″ Mark IX. .	11	2	2·00	0·36	11·76	D. Simpson, P.O. (1) .	2	..	2
				12	6″ B.L. VII. (*b*)	73	34	6·08	2·83	32·78	F. Etheridge, A.B. .	7	..	34
94	Pioneer	2nd	29·77	8	4″ Q.F. . . .	53	21	8·83	3·50	29·77	A. Clarke, P.O. (2) . .	7	13	21
95	Lord Nelson . .	1st	29·56	4	12″ Mark X. .	14	5	2·55	0·91	24·73	H. Vandy, C.P.O. . .	3	..	5
				8	9·2″ Mark XI.	33	11	4·13	1·38	26·18	H. Wood, P.O. (1) . .	3	..	11
				2	9·2″ Mark XI.	13	7	3·25	1·75	41·16	W. Waters, L.S. . .	6	..	7
96	Highflyer . . .	1st	29·19	11	6″ Q.F. . . .	68	21	6·18	1·91	29·19	W. Alford, Lce.-Cpl., R.M.L.I.	6	..	21
97	Vulcan . . .	1st	28·55	8	4·7″ Q.F. . .	59	18	7·38	2·25	28·55	F. Stone, C.P.O. . .	5	..	18

(*a*) = full or ¾ charges. (*b*) = ½ charges.

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Results of Test of Gunlayers with Heavy Guns—*continued.*

Order of Merit.	Ship.	Whether 1st or 2nd Firing.	Points.	No. of Men Firing.	Guns.]	Rounds.	Hits.	Per Minute.		Points per Gun or Turret.	Best Shot in Ship.	Hits made by Best Shot.	Comparison with 1908 Results.	
								Rounds.	Hits.				Hits, 1908.	Hits, 1909.
98	Prometheus	1st	28·35	8	4″ Q.F.	52	20	8·67	3·33	28·35	G. Davis, P.O. (2)	4	..	20
	Thistle	2nd	28·35	2	4″ Q.F.	13	5	8·67	3·33	28·35	F. Yeo, A.B.	4	5	5
100	Brilliant	2nd	28·27	2	6″ Q.F.	11	4	5·50	2·00	30·58	F. Hopley, A.B.	4	2	4
				6	4·7″ Q.F.	39	13	6·50	2·17	27·50	W. Campbell, A.B.	4	16	13
101	Amethyst	1st	26·46	12	4″ Q.F.	69	28	7·67	3·11	26·46	A. Morgan, P.O. (2)	4	..	28
	Shearwater	1st	26·46	6	4″ Q.F.	49	14	10·89	3·11	26·46	H. Bourne, A.B.	4	..	14
103	Formidable	1st	24·82	4	12″ Mark IX.	12	2	2·18	0·36	11·76	W. Pysden, P.O. (1)	1	..	2
				12	6″ B.L. VII. (*b*)	59	28	4·92	2·33	27·00	F. Sprattling, P.O. (1)	5	..	28
104	Pyramus	2nd	24·10	8	4″ Q.F.	50	17	8·33	2·83	24·10	J. McIlroy, L.S.	4	19	17
105	Swiftsure	1st	21·63	4	10″ B.L.	14	2	3·50	0·50	14·29	H. McCusker, P.O. (1)	1	..	2
				14	7·5″ B.L.	70	32	2·86	1·31	22·67	G. Dommett, P.O. (1)	4	..	32
106	Implacable	1st	20·69	4	12″ Mark IX.	12	2	2·18	0·36	11·76	G. Buckett, L.S.	1	..	2
				12	6″ B.L. VII. (*b*)	81	23	6·75	1·92	22·18	G. Allen, A.B.	4	..	23
107	Gossamer	1st	19·04	2	4·7″ Q.F.	12	3	6·00	1·50	19·04	H. Willey, L.S.	3	..	3
108	Sapphire	1st	17·96	12	4″ Q.F.	69	19	7·67	2·11	17·96	E. Marshall, P.O. (1)	5	..	19
109	Isis	1st	16·83	11	6″ B.L. VII. (*b*)	45	16	4·09	1·45	16·83	W. Quarm, L.S.	4	..	16
110	Boadicea	1st	15·89	6	4″ B.L. VII.	25	7	5·56	1·56	15·89	A. Jones, P.O. (1)	2	..	7
111	Blenheim	2nd	15·29	4	6″ Q.F.	24	4	6·00	1·00	15·29	B. Allen, C.P.O.	2	12	4
111a	Pegasus	..	15·59	8	4″ Q.F.	51	11	8·50	1·83	15·59	T. Witthames, P.O. (1)	3	..	3
112	Proserpine	1st	14·18	8	4″ Q.F.	47	10	7·83	1·67	14·18	A. Compton, P.O. (1)	3	..	10
113	Leda	1st	12·69	2	4·7″ Q.F.	8	2	4·00	1·00	12·69	E. Foster, C.P.O.	2	..	2
114	Barham	1st	10·58	6	4·7″ Q.F.	23	5	3·83	0·83	10·58	G. Heath, L.S.	3	..	5
115	Halcyon	1st	6·35	2	4·7″ Q.F.	11	1	5·50	0·50	6·35	H. Gower, A.B.	1	..	1
116	Circe	1st	0·00	2	4·7″ Q.F.	12	0	6·00	0·00	0·00	———	0	..	0

(*a*) = full or ¾ charges. (*b*) = ½ charges.

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Gun.	Best Ship.	Total Number of			Average per minute. Rounds.	Hits per minute
		Guns.	Rounds.	Hits.		
12-in. B.L.	Superb (Home, 1st Div.)	5*	51	36	3·71	2·62
Totals 1909.		84*	659	296	2·85	1·28
,, 1908.		71*	533	217	2·73	1·11
Difference		+13	+126	+79	+0·12	+0·17
9·2-in., Mark XI.	Minotaur (Home, 1st Div.)	2*	17	12	4·25	3
Totals 1909.		14*	125	58	4·46	2·07
,, 1908.		4*	35	14	4·37	1·75
Difference		+10	+90	+44	+0·09	+0·32
9·2-in., Marks X. & XI.	Natal (Home, 2nd Div.)	6	53	44	4·42	3·67
Totals 1909.		78	573	361	3·67	2·31
,, 1908.		80	585	380	3·65	2·37
Difference		−2	−12	−19	+0·02	−0·06
7·5-in.	Natal (Home, 2nd Div.)	4	43	38	6·14	5·43
Totals 1909.		94	787	406	4·78	2·47
,, 1908.		60	509	263	4·84	2·50
Difference		+34	+278	+143	−0·06	−0·03
6-in., Mark XI.	Britannia (Home, 2nd Div.)	10	79	51	7·90	5·10
Totals 1909.		50	360	210	7·20	4·20
,, 1908.		50	349	204	6·98	4·08
Difference		..	+11	+6	+0·32	+0·12
6-in., Marks VII. & VIII.	King Alfred (China)	16	152	109	9·50	6·81
Totals 1909.		466	3475	2006	7·43	4·30
,, 1908.		514	3629	2072	7·06	4·03
Difference		−48	−154	−66	+0·37	+0·27
6-in. Q.F.	Victorious (Home, 3rd Div.)	12	74	56	6·17	4·67
Totals 1909.		234	1428	803	6·10	3·43
,, 1908.		264	1753	1021	6·64	3·86
Difference		−30	−325	−218	−0·54	−0·43
4·7-in. Q.F.	Astræa, China	8	68	39	8·50	4·88
Totals 1909.		90	613	250	6·81	2·78
,, 1908.		92	724	320	7·92	3·50
Difference		−2	−111	−70	−1·11	−0·72
4-in. Q.F.	Inflexible (Home, 1st Div.)	16	143	109	11·92	9·08
Totals 1909.		142	1022	510	9·59	4·78
,, 1908.		140	884	331	8·42	3·15
Difference		+2	+138	+179	+1·17	+1·63

* Turrets.

12 in., 1 run of 2¾ minutes or 2 runs of 1⅜ minutes per turret.
9·2 in., 1 run of 2 minutes per turret.
7·5 in., 1 run of 1¾ minutes.
6 in. and 4·7 in., 1 run of 1 minute.

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Abstract of Results of Battle Practice in H.M. Fleet, 1909.

Order of Merit.	Fleet.	No. of Ships.	No. of Guns.	Average Points.	First Ship in Fleet.	Score.
1	China	5	70	348·68	King Alfred . .	510·4
2	1st Division Home Fleet and 1st Cruiser Squadron	13	154	293·63	Boadicea . . .	541·66
3	Mediterranean and 6th Cruiser Squadron	13	181	195·56	Canopus	459·82
4	3rd Division, Home Fleet	13	174	187·5	Sutlej	443·75
5	2nd Division Home Fleet and 2nd Cruiser Squadron	14	212	177·76	Warrior	320·31
6	Atlantic and 5th Cruiser Squadron	10	145	142·17	Argyll	401·78
	Ships inside range .	4	47	289·41		
	Total, 1909 . .	72	983	216·78		
	Total, 1908 . .	63	890	203·44		
	Difference . .	+9	+93	+13·34		

Fired at Fixed Target.

1	Australia	5	53	275·42	Pyramus . . .	406·25
2	Cape of Good Hope .	3	29	262·93	Forte	325·0
	Ship inside range .	1	11	250·00		
	Total, 1909 . .	9	93	268·43		
	Total, 1908 . .	11	108	186·09		
	Difference . .	−2	−15	+82·34		

SCOUTS.

Fired at Two Targets.

—	Scouts (Home Fleet)	7	116	196·86	Foresight . . .	357·14
—	Ship inside range .	1	16	171·87		

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Austro-Hungarian Navy Estimates, 1909-10.*

(Converted at £1 = 24 Kronen.)

Heads of Expenditure.	Estimates, 1909-10.	Estimates, 1908-9.
ORDINARY ESTIMATES.	£	£
Pay of Officers, etc.	237,851	207,582
Pay and Clothing—petty officers and seamen	209,583	184,482
Land Service	105,524	93,427
Sea Service	282,792	264,105
Shore Establishments	29,502	28,848
Maintenance of Fleet	446,556	425,905
New Construction, viz.:—		
(A) Hulls and Machinery: Battleship Erzherzog Franz Ferdinand, 14,500 tons, 3rd instalment	250,000	208,333
(A) Hulls and Machinery: Battleship Radetsky, 14,500 tons, 3rd instalment	125,000	83,333
(A) Hulls and Machinery: Battleship Zrinyi, 14,500 tons, 3rd instalment	83,333	83,333
(A) Hulls and Machinery: Cruiser Admiral Spaun, 3,500 tons, 2nd instalment	83,333	83,333
(A) Hulls and Machinery: 12 Torpedo-boats, 100 tons, 2nd instalment.	41,667	41,667
(B) Guns, torpedo fittings, &c., for above-named vessels	249,998	216,667
Guns and Small Arms	146,917	145,042
Miscellaneous	181,639	175,947
	2,473,695	2,242,004
Less Special Receipts	15,885	11,874
Total of Ordinary Estimates	2,457,810	2,230,130
EXTRAORDINARY ESTIMATES.		
Pay and Clothing, &c.	4,792	—
Shore Establishments, Charts, etc.	125	937
Floating-Dock	62,500	62,500
Large Alterations, Kaiserin M. Theresia and Erzherzog Albrecht	25,000	—
Guns and Small Arms, Torpedo Fittings, Mines, &c.	29,166	38,750
Buildings	50,104	30,583
Miscellaneous	13,750	12,100
	£2,643,247	£2,375,000

* The figures for 1910-1911 have not been received at the time of going to press.

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French Navy Estimates, 1910.

Cap. in Estimates, 1910.	Heads of Expenditure.	Credits proposed for 1910.	Credits voted for 1909.
	PERSONNEL.	£	£
1, 2	Admiralty Office	157,432	153,633
5, 6, 7	Navy Pay	2,380,083	2,318,608
8	Inspection of Administrative Services .	13,016	13,137
9, 10	Construction and Ordnance Staff . .	310,570	300,035
11, 12, 14, 15	Administrative Staff, Commissariat, and Inscription Maritime	344,117.	314,411
13	Medical Staff	76,676	76,562
52	Fisheries and Navigation	40,602	34,882
	LABOUR.		
	Wages—		
27	Shipbuilding; new construction; fitting for sea	469,840	477,840
30	Shipbuilding; repairs	216,440	217,840
24, 31	Master-attendants' and Storekeepers' Departments	264,092	279,443
36	Armaments; construction of new guns .	120,365	120,365
38, 40	Armaments; repairs	110,850	111,958
43	Works	19,982	20,800
18	Victualling	30,521	31,800
20	Hospitals, &c.	15,901	16,780
	MATÉRIEL.		
	Stores and Supplies—		
3	Admiralty	6,968	7,680
28	Shipbuilding in Dockyards . . .	1,160,000	1,440,000
34, 35	Shipbuilding by contract . . .	2,263,000	2,093,000
31, 33	Fitting for sea; maintenance; repairs .	594,000	586,000
	Carried forward . .	£8,594,455	£8,614,774

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Cap. in Estimates, 1910.	Heads of Expenditure.	Credits proposed for 1910.	Credits voted for 1909.
		£	£
	Brought forward - -	8,594,455	8,614,774
	MATÉRIEL—*continued.*		
	Stores and Supplies—*continued.*		
25, 26	Repairs, conversions, &c., in dockyards and by contract	670,707	621,175
37, 39 41	Armaments; new guns and conversions; Powder, ammunition, repairs, tools, &c.	1,253,074	1,264,027
29	Torpedoes	199,000	..
43	Works; new and large alterations. .	80,480	89,800
42, 45	Ditto; supplementary for defence of military ports	616,400	616,800
47	Ditto; repairs	67,455	57,654
46	New Naval Hospital, Toulon . .	9,802	28,000
4	Hydrographic Service	19,480	14,200
16	Clothing, &c.	141,265	141,229
17, 19	Victualling	891,040	845,695
21	Hospitals, &c.	80,400	76,400
48, 49	Fuel, lighting, office furniture, printing, &c.	46,583	45,623
	MISCELLANEOUS.		
22, 23	Travelling expenses, freight, allowance for lodgings, &c.	239,864	224,864
50	Charitable and subscriptions . . .	37,999	34,220
51	Pay of Reserve Officers	35,497	35,497
53	Fisheries and Commerce (materials for protection, &c.)	23,020	18,640
54	Mercantile Marine; Travelling expenses.	5,800	5,800
55	Pensions	643,499	615,426
56	Secret Service	4,000	4,000
	Total . .	£13,659,820	£13,353,824

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Programme of New Construction, to be continued or undertaken in 1910.—Building in Dockyards.

Class.	Names of Ships.	Where Building.	Date of Commencement.	Proposed Date of Completion.	Estimated Cost.	Probable Expenditure in 1910.
					£	£
Battleships. . .	Danton . . .	Brest. .	1908	1911	2,069,682	504,727
	Mirabeau . . .	Lorient .	1908	1911	2,030,708	459,306
Armoured Cruisers, First-class .	Edgar-Quinet .	Brest. .	1905	1910	1,381,602	240,063
	Waldeck-Rousseau	Lorient .	1906	1910	1,405,794	200,036
Submarines . .	Pluviôse . . .	Cherbourg	1906-1908	1908-1911	738,537	134,276
	Ventôse . . .					
	Germinal . . .					
	Floréal . . .					
	Prairial . . .					
	Messidor . . .					
	Thermidor . .					
	Fructidor . . .					
	Vendémiaire . .					
	Brumaire . . .					
	Primaire . .					
	Nivôse . .					
	Monge . . .	Toulon .	1906	1909	193,585	16,611
	Ampère . .					
	Gay-Lussac . .					
22 Submarines .	Q 70 to Q 91 . .	Rochefort, Toulon, Cherbourg	—	—	1,615,872	505,760
5 Torpedo-boat Destroyers .	M 81 to M 85 .	Toulon . Rochefort	—	—	482,207	49,061
	Total building in Dockyards				£ 9,917,987	2,109,840

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Programme of New Construction, to be continued or undertaken in 1910.—Building by Contract.

Class.	Names of Ships.	Where Building and to be Completed.	Date of Commencement.	Proposed Date of Completion.	Estimated Cost.	Probable Expenditure in 1910.
					£	£
Battleships . .	Voltaire . .	La Seyne—Toulon. .	1906	1911	2,168,765	672,795
	Diderot . .	St. Nazaire—Brest. .	1906	1911	2,167,565	536,749
	Condorcet . .	„ „ . .	1906	1911	2,165,565	568,852
	Vergniaud . .	Bordeaux—Toulon. .	1906	1911	2,165,565	503,466
	Spahi . . .	Le Havre—Cherbourg.	1906	1908	76,215	4,000
	Voltigeur . .	Nantes—Lorient . .	1906	1909	86,720	4,800
	Tirailleur . .	Bordeaux—Lorient .	1906	1909	85,459	4,800
	Chasseur . .	Le Havre—Cherbourg .	1906	1909	84,971	4,800
	Hussard . .	Nantes—Lorient . .	1906	1908	75,143	4,000
	Caribinier . .	Rouen—Cherbourg .	1906	1908	76,815	4,000
	Lansquenet .	„ „ . .	1907	1909	65,855	9,170
	Mameluck . .	Nantes—Lorient . .	1907	1909	65,695	3,280
	Janissaire . .	Rouen—Cherbourg. .	1907	1910	78,661	19,901
	Fantassin . .	Le Havre—Cherbourg .	1907	1909	78,665	19,040
	Cavalier . .	„ „ .	1907	1910	80,655	20,328
	Cimeterre (ex M 66)	—	1908	1911	105,693	30,124
	Dague (ex M 67)	—	1908	1911	105,693	24,485
	Fourche (ex M 68)	—	1908	1911	105,693	50,124
	Faulx (ex M 69)	—	1908	1911	105,693	24,486
	Boutefeu (ex M 70)	—	1908	1911	103,393	46,124
	Bouclier (ex M 71)	—	1908	1911	115,093	28,486
	Casque (ex M 72)	—	1908	1911	113,613	28,486
	M 73 to M 80 .	—	1909	1912	888,740	193,756
Sea-going Torpedo Boats 200 tons . .	M 22 and M 23.	—	—	—	89,298	2,400
	Total building by Contract				£ 11,255,223	2,808,452

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German Navy Estimates, 1910.

(*Converted at £1 = 20·43 marks.*)

Ordinary Permanent Estimates.

Heads of Expenditure.	Estimates for the financial year 1910.	Granted for the financial year 1909.*
	£	£
Imperial Navy Office	109,591	113,155
Admiralty Staff	16,006	16,224
Look-out Stations and Observatories	19,749	19,677
Station Superintendencies	42,318	40,350
Administration of Justice	10,767	10,113
Naval Chaplains and Garrison Schools	9,501	9,095
Navy Pay	1,780,928	1,670,091
Maintenance of Ships in Commission	2,131,424	1,915,869
Victualling	147,240	162,528
Clothing	22,253	21,528
Garrison Works and Administration	107,138	95,883
Lodging Allowance	200,382	192,517
Medical Department	150,410	137,090
Travelling Expenses, Freight Charges, &c.	174,781	174,390
Training Establishments	28,637	27,359
Maintenance of Fleet and Docks	1,804,839	1,716,114
Ordnance and Fortification	789,284	692,675
Accountants' Department	57,649	54,406
Pilotage, Coastguard, and Surveying Service	39,977	40,013
Miscellaneous Expenses	85,504	81,574
Total of Ordinary Permanent Estimates, carried to next page	£ 7,728,378	7,190,651
Administration of Kiau-chau Protectorate	7,915	7,637
	7,736,293	7,198,288

* Including Supplementary Estimate, £164,627.

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Special Ordinary Estimates.

Shipbuilding Programme for the Financial Year 1910.

For the Construction of—	£
Battleship Rheinland (Ersatz Württemberg), 4th and final instalment	238,375
Battleship Posen (Ersatz Baden), 4th and final instalment	238,375
Large cruiser von der Tann (F)	318,159
Battleship Ostfriesland (Ersatz Oldenburg), 3rd instalment	293,686
„ Helgoland (Ersatz Siegfried) „	293,686
„ Thüringen (Ersatz Beowulf) „	293,686
Large cruiser (G) „	391,581
Small cruiser Köln (Ersatz Schwalbe), 3rd and final instalment	73,420
„ Augsburg (Ersatz Sperber) „	73,420
Battleship Ersatz Frithjof, 2nd instalment	513,954
„ Ersatz Hildebrand „	513,954
„ Ersatz Heimdall „	513,954
Large cruiser (H) „	538,420
Small cruiser Ersatz Bussard „	122,370
„ Ersatz Falke „	122,370
Tender to Torpedo-experiments ship, 2nd and final instalment	2,447
Battleship, Ersatz Hagen, 1st instalment	269,210
„ Ersatz Aegir „	269,210
„ Ersatz Odin „	269,210
Large cruiser (J) „	244,738
Small cruiser Ersatz Cormoran 1st instalment	122,370
„ Ersatz Condor „	122,370
Torpedo nets, 1st instalment	48,947
One Torpedo-boat Division, 2nd and final instalment	445,423
„ „ „ 1st instalment	489,476
Submarines, construction and experiments	734,214
Alteration and improvement of battleships Kaiser class, 3rd instalment	63,631
Alteration and improvement of large cruiser Vineta, 2nd and final instalment	34,264
Alteration and improvement of small cruisers	48,948
Construction of casemates on battleships, 2nd and final instalment	11,258
Total	**£7,715,126**

Summary.

	Estimates for the financial year 1910.	Granted for the financial year 1909.
	£	£
Ordinary Permanent Estimates	7,736,293	7,198,288
New Construction and Alterations	7,715,125	7,074,894
Armaments, Torpedoes, and Mines	4,206,070	3,681,840
Other items	603,978	543,092
Extraordinary Expenditure	986,122	1,214,221
Total £	21,247,588	19,712,335

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Italian Navy Estimates, 1910–11.

FINANCIAL YEAR 1ST JULY, 1910, TO 30TH JUNE, 1911.

(Converted at £1 = 25 lire.)

	Proposed for 1910–1911.	Proposed for 1909–1910.
ORDINARY EXPENDITURE—GENERAL EXPENSES.	£	£
Admiralty	111,000	109,926
Pensions	323,020	307,020
Expenditure for the Mercantile Marine	407,774	407,834
Total £	841,794	824,780
EXPENDITURE FOR NAVAL SERVICES.	£	£
General Staff of the Navy	180,000	179,720
Corps of Engineers	77,548	77,360
Medical Service	33,000	32,904
Commissariat Service	38,792	41,160
Pay of Officers, and Wages and Clothing of Men	624,024	625,384
Gratuities, &c.	172,000	169,200
Forts—*Personnel*	17,600	17,720
Telegraph Service—*Personnel*	15,000	15,000
" " *Matériel*	6,600	6,600
Police (Dockyards)	12,760	12,760
Salaries and Office Expenses	8,512	8,592
Barracks, Maintenance, Lighting, etc.	8,800	8,800
Rents and Water Royalties	2,624	2,480
Ships fitting out, &c.	304,040	314,040
Fuel and Stores for Ships in Commission	337,000	337,000
Victualling	408,736	394,736
Hospital Services	31,800	23,800
Naval Academy and Engineering School	17,748	17,668
Scientific Services—*Personnel*	5,000	4,760
" " *Matériel*	6,320	6,560
Wireless Telegraph Stations, Benadir and Eritrea	4,400	4,400
Workshops, Fortifications, and Stores—*Personnel*	73,640	73,080
Technical Department (Civil)—*Personnel*	39,280	39,800
Naval Constructors	25,720	26,000
Law Charges	1,344	1,344
Transport of Materials	8,600	8,600
Works Department—Repairs	101,720	101,880
Plant, Machinery and Tools; Reconstruction and maintenance of Workshops	70,000	70,000
Electric Power, Fuel and Stores for Shore Establishments	68,000	62,000
Materials for construction of new Ships and maintenance of existing Ships—Hulls, Machinery, and Armaments	1,734,806	1,265,589
Expenditure authorised under law of 27th June, 1909, not relating to shipbuilding	200,000	—
Wages and Expenses of Dockyard employés	740,800	740,000
Guns, Torpedoes and Small Arms	124,800	124,800
Supernumerary Labour in Dockyards	32,000	30,000
Coast Defence—*Matériel*	12,000	12,000
Adaptation of Mercantile Auxiliaries	4,000	4,000
Total (to next page) £	5,549,014	4,859,737

The Estimates for 1910–11 provide for the completion of the cruiser S. Marco, and the commencement and continuation of battleships Dante Alighieri, Conte di Cavour, Giulio Cesare, Leonardo da Vinci, and various subsidiary vessels.

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	Proposed for 1910-1911.	Proposed for 1909-1910.
Extraordinary Expenditure.	£	£
Temporary Civil Staff	9,520	10,600
General Expenses and Half Pay	2,000	2,000
Construction and purchase of Ships, and Materials for the Navy (Law of July 2, 1905)	440,000	440,000
Reorganization of Storehouses and Bakeries	—	—
„ „ Ammunition Depôts	—	—
Total £	451,520	452,600

Summary.

	£	£
Ordinary Expenditure—General Expenses	841,794	824,780
Expenditure for Naval Services	5,549,014	4,859,737
Extraordinary Expenditure	451,520	452,600
Depreciation of Ships in Commission	—	140,000
Rent of Lands occupied by Government	108,659	108,323
Grand Total £	6,950,987	6,385,440

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Japanese Navy Estimates, 1910.

Converted at £1 = 10 yen.

Ordinary Estimates.

		£
1.	Admiralty	19,779
2.	Pay and Allowances	1,227,940
3.	Offices	44,587
4.	Repairs to Buildings	25,851
5.	Travelling	61,539
6.	Miscellaneous	34,989
7.	Allowances to Cadets and Petty Officers for Clothing, etc.	38,593
8.	Clothing and Provisions	705,139
9.	Shipbuilding, Armament, and Repair	1,014,096
10.	Manœuvres	27,336
11.	Hospital Expenses	21,942
12.	Naval Harbours	40,321
13.	Family Allowances to Petty Officers and Men	32,204
14.	Maintenance of Ships, Dockyards, etc.	563,993
15.	Prisoners	631
16.	Hydrographic	26,768
17.	Salaries to Foreigners	1,404
18.	Secret Service	8,000
19.	Maintenance	2,000
20.	Miscellaneous Defrayment	2,099
		£3,899,211

Extraordinary Estimates.

		£
1.	New Works and Repairs	32,973
2.	Chiukai Naval Station	55,230
3.	Repairs in Naval Dockyards of Vessels not belonging to Navy	21,228
4.	Naval Works Department	1,877
5.	Making Charts	1,500
6.	New Construction and Guns	179,036
7.	Working Coal Mines	6,392
8.	Writing History of War	2,493
9.	Naval Replenishing Fund *	1,527,525
10.	Naval Repair Fund	775,658
11.	Naval Hoju Fund †	1,068,958
12.	Making Naval Grounds in Korea	3,000
13.	Magazine Cooling Arrangements	30,000
14.	Salving parts of the Matsushima	3,000
		£3,708,870

Summary.

	£
Ordinary Estimates	3,899,211
Extraordinary ,,	3,708,870
	£7,608,081

* For replacing ships lost in the war.

† For replacing obsolete ships.

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Russian Navy Estimates, 1910.

Heads of Expenditure.	Proposed Estimates, 1910.	Net Estimates, 1909.
Effective Services—	£	£
Pay, Wages, &c., of Officers and Men	1,279,809	1,376,838
Victualling and Clothing	883,069	986,785
Medical Establishments and Services	99,661	98,722
Martial Law	23,836	24,240
Educational Services	119,995	118,088
Scientific Services	146,912	111,121
Shipbuilding, Repairs, &c.	4,788,537	4,179,376
Armaments	1,227,400	1,188,672
Works, Buildings, Repairs	419,284	513,642
Miscellaneous	733,200	540,838
Admiralty Office	86,253	90,339
Total Effective Services	9,807,956	9,228,661
Non-effective Services—		
Pensions, Gratuities, &c.	93,060	127,018
Non-recurring Expenditure—		
Clothing for Black Sea Fleet	—	63,431
Supplementary Vote, Baltic Fleet	318,750	476,531
Grand Total	£10,219,766	9,895,641

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United States Navy Estimates, 1910–11.

(Converted at £1 = $4·8665, being par, as adopted by Congress.)

Objects of Expenditure and Appropriation.	Appropriated for year ending June 30, 1910.	Appropriation Bill, year ending June 30, 1911.
	£	£
Pay of the Navy	6,740,674	6,856,795
Pay, Miscellaneous	178,475	178,475
Contingent, Navy	9,470	15,617
Naval Station (for Lepers), Island of Guam	2,877	2,877
Bureau of Navigation	698,403	659,122
„ Ordnance	2,440,842	2,381,280
„ Equipment	1,942,788	1,651,762
„ Yards and Docks	314,395	263,023
Public Works under Bureau of Yards and Docks	995,547	1,300,575
Public Works under Secretary of Navy (Naval Academy)	15,411	8,219
Public Works under Bureau of Navigation (Training Stations and War College)	105,118	3,350
Public Works, Bureau of Ordnance	61,928	53,345
„ „ „ Equipment	2,055	2,055
„ „ „ Supplies and Accounts	3,288	—
„ „ „ Medicine and Surgery	—	30,825
„ „ Marine Corps	118,463	42,844
Bureau of Medicine and Surgery	87,270	81,682
„ Supplies and Accounts	1,603,675	1,677,812
„ Construction and Repair	1,875,710	1,872,196
„ Steam Engineering	1,406,915	1,290,660
Naval Academy	109,790	107,017
Marine Corps	1,448,332	1,443,962
Increase of Navy:—		
Construction and Machinery	4,678,280	3,714,323
Torpedo Boats, Submarines	616,459	341,102
Colliers	—	61,646
Armour and Armament	2,558,877	2,382,538
Equipment	123,292	92,366
Total	£28,138,334	£26,515,468

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FRENCH NAVAL REORGANIZATION AND NAVY LAW.

THE following is the essential portion of the preamble to the projet de loi presented to the Chamber by Vice-Admiral Boué de Lapeyrère, Minister of Marine, and M. Georges Cochery, Minister of Finance, February 9th, 1910, followed by an extract from the measure itself giving the intended composition of the Fleet, and a table showing the order in which vessels are to be laid down.

LE projet de loi a pour but d'abord :

De constituer une flotte de combat capable d'agir vigoureusement dans toutes les éventualités de guerre ;

De prévoir les bâtiments indispensables aux besoins de la politique de la France à l'extérieur ;

D'organiser une flotte des défenses sous-marines destinée à couvrir les bases d'opérations de la flotte et à occuper des points stratégiques particuliérement importants ;

Enfin, de fixer les régles essentielles servant à la détermination des effectifs et des approvisionnements à entretenir pour les besoins de la flotte ainsi constituée.

Mais les transformations profondes et successives du matériel naval ne permettent pas de spécifier, en les immobilisant dans le cadre étroit d'une loi, en les rendant en quelque sorte définitives, les caractéristiques des différentes classes de bâtiments de guerre.

Il appartient au Ministre de la Marine, après consultation du Conseil supérieur, de statuer sur les questions si complexes des constructions navales : armement, protection, vitesse et rayon d'action, de manière à toujours mettre en chantier les unités les plus perfectionnées pour chaque type considéré.

Par contre il est dans le caractère de la loi de désigner, toutefois sous des vocables assez larges, les diverses catégories de bâtiments que doit comprendre la composition de la flotte.

CUIRASSÉS D'ESCADRE.

Dans cet ordre d'idées, le projet de loi n'admet pour la flotte de combat de ligne qu'un type unique : le cuirassé d'escadre. Pour la détermination du nombre des cuirassés le Conseil supérieur de la marine avait, dans la session de mai et de juin 1909, tracé "un programme idéal de la flotte future," suivant l'expression de M. le Président de la Commission parlementaire d'enquête sur la marine. Ce programme, qui faisait abstraction de toute considération budgétaire a guidé nos conceptions, mais on a dû reconnaître qu'il n'était pas intégralement réalisable. Il fallait l'adapter aux exigencies de notre politique extérieure, tout en tenant compte de l'effort que permettent les ressources financières du pays. Cette adaptation a conduit à limiter à 28 le nombre des cuirassés nécessaires, répartis en 4 escadres de 6 unités avec 4 unités de remplacement. Le nombre de 6 unités par escadre a été choisi, dans notre marine, après une longue pratique de la navigation d'escadre. Les raisons de manœuvre qui l'avaient fait adopter n'ont pas seulement conservé toute leur valeur, elles sont encore renforcées par l'accroissement rapide des dimensions des cuirassés qui a pour conséquence l'allongement des lignes de bataille. Ces cuirassés seront répartis en deux armées navales composées de deux escadres, l'une à effectifs complets, l'autre à effectifs un peu diminués pour alléger les charges financières, mais toutefois suffisants pour permettre l'entraînement méthodique du personnel et la mise rapide de ces escadres sur le pied de guerre.

ÉCLAIREURS.—BÂTIMENTS TORPILLEURS DE HAUTE MER.

L'éclairage et la garde des escadres sont assurés par des *éclaireurs* et des *bâtiments torpilleurs de haute mer*. Un seul type est prévu pour chacune de ces classes de bâtiments. Les éclaireurs sont aussi nécessaires aux escadres que la cavalerie aux armées de terre. Il faut remarquer toutefois que la construction des éclaireurs ne se pose pas en ce moment. La marine française possède, en effet, un nombre

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suffisant de croiseurs cuirassés pour les besoins actuels de l'éclairage de ses escadres. Mais, en 1917, le choix s'imposera d'un type d'éclaireur d'escadre très rapide en raison de l'accroissement de la vitesse moyenne des bâtiments de ligne. Des études entreprises dès maintenant permettront d'arrêter, lorsque le moment sera venu, les caractéristiques rationnelles qu'il conviendra d'adopter pour ce type de bâtiment. Quant aux bâtiments torpilleurs de haute mer, ils doivent avoir un tonnage élevé leur permettant d'accompagner les escadres par tous les temps.

Divisions navales lointaines.

Si des intérêts militaires de premier ordre nécessitent le maintien dans les eaux métropolitaines d'une flotte de combat puissante, la Marine doit cependant être prête à seconder les efforts de notre diplomatie dans les mers lointaines. Pour remplir ce rôle spécial on ne pourrait sans danger, sauf circonstances exceptionnelles, détacher des bâtiments compris dans les escadres de ligne pour les envoyer dans des régions qui les éloigneraient de leur poste de combat. Il est donc nécessaire de posséder une flotte de *divisions navales lointaines* composée de bâtiments aptes à la navigation dans les pays chauds et, en quelque sorte, spéciaux. Quelques-uns d'entre eux, sans avoir la prétention d'entrer en lutte avec les unités de ligne des grandes marines d'outre-mer, devront cependant être assez puissants pour engager une action décisive avec les bâtiments européens stationnant habituellement au loin, et avec leurs similaires de toutes nationalités. A cet effet, ils seront solidement armés, suffisamment cuirassés et constitueront une division dont le champ d'action s'etendra sur les mers d'Extrême-Orient et du Pacifique. En dehors d'eux ou plus exactement à côté d'eux il faudra, à notre pays, pour montrer le pavillon et remplir les missions diverses qui s'imposent à une puissance maritime, un groupe de bâtiments légers, de moindre déplacement. La question de la construction de ces deux dernières classes de bâtiments ne se posera d'ailleurs pas avant 1920, époque du remplacement des navires auxquels on peut aujourd'hui confier ces missions. Mais il a paru indispensable de fixer, dans la loi, le principe de la nécessité des divisions navales lointaines. La France ne peut, en effet, sans déchoir, renoncer, systématiquement aux moyens les plus sûrs de faire respecter ses droits et rayonner son influence. Il convient donc de créer des instruments appropriés, en vue d'atteindre ce double résultat au mieux des finances de l'Etat. D'autre part le projet le loi ne mentionne que pour mémoire les avisos et canonnières employés dans les stations lointaines. L'utilisation de ces bâtiments, dont le nombre va sans cesse en diminuant, est essentiellement variable.

Torpilleurs garde-côtes et sous-marins.

Dans le but de donner à notre flotte de haut bord toute la liberté d'action qui lui est nécessaire pour les besoins de sa vigoureuse offensive, on a prévu la constitution d'une flotte dite des défenses sous-marines, dont le rôle principal est de miner, en avant des côtes, les routes probables de l'ennemi et d'assurer, contre des coups de main, la garde des bases d'opérations de notre flotte de haute mer. Tel sera le rôle des bâtiments torpilleurs garde-côtes encore en serviee et celui des bâtiments sous-marins. Ils sont les auxiliaires les plus précieux de la flotte de combat car, sans eux, les opérations offensives, les seules décisives, les seules qui mettent réellement le pays à l'abri, ne pourraient pas être entreprises. Ils sont la condition de l'offensive. D'autre part il faut prévoir, dès à présent, la fusion des types des bâtiments torpilleurs et des sous-marins. Elle se réalisera dès que les progrès de l'art naval, si rapides de nos jours, donneront aux sous-marins, une vitesse en surface comparable à celle des torpilleurs actuels. Le projet de loi ne mentionne en quelque sorte que pour mémoire les bâtiments porteurs et mouilleurs de mines et les dragueurs de mines. Il serait en effet prématuré d'etablir, dès à présent, des précisions pour le nombre de ces bâtiments dont l'utilisation est sujette à des variations. Mais leur nécessité n'est pas discutable et il y a lieu d'en prévoir la construction immédiate.

Bâtiments des services spéciaux.

Les diverses nations ont un grand nombre de navires spéciaux pour les besoins des services secondaires. Il a paru que la plupart pouvaient être considérés comme faisant parte de l'outillage des ports (bâtiments de servitude) et que, d'autre part, il convenait de limiter au strict minimum le nombre de ceux à prévoir, dans la loi, en tenant largement compte des ressources de la marine de commerce auxquelles on pourrait faire appel.

C'est ainsi que dans les *bâtiments des services spéciaux* ne sont indiqués que les navires nécessaires aux travaux hydrographiques, ceux qui doivent être aménagés pour les transports de matériel de guerre de port à port, les grands bâtiments affectés à la surveillance de la pêche et les bâtiments-écoles. Encore, relativement à ces derniers, les anciennes unités de combat atteintes par la limite d'âge seront-elles utilisées pour le service des pêches et pour la formation du personnel officier et marin.

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RENOUVELLEMENT DE LA FLOTTE.—AGE LIMITE DES BÂTIMENTS.

La date d'achèvement du programme de la composition de la flotte, proposée au Parlement, est l'année 1919. Mais, dans la composition d'une flotte, il ne faut pas seulement tenir compte des unités nouvelles qui viennent en accroître le nombre; il est indispensable d'envisager la décroissance annuelle de valeur des unités vieillies provenant tant de l'usure normale du matériel que des progrès accomplis dans les différentes branches de l'art naval. A cet affaiblissement régulier, il importe de remédier par des prévisions rationnelles de remplacement. Et, pour ne pas donner au pays de dangereuses illusions en maintenant dans la composition de la flotte des unités dont la valeur militaire ne répond plus aux nécessités actuelles, il convient de fixer la durée normale du service actif que l'on peut attendre des types de chaque classe de bâtiments. Aucune règle n'a été établie, jusqu'à ce jour, pour déterminer la durée d'une unité de combat. De là, grande irrégularité dans les mises en chantier. Or, les constructions par à-coups ont des conséquences que l'exécution des derniers programmes à mises en lumiere. L'effort exceptionnel demandé à l'industie nécessite des frais supplémentaires d'outillage qui majorent fatalement les prix de revient. L'accroisement momentané du travail crée des difficultes plus sérieuses encore, en ce qui concerne la main-d'œuvre. La simultanéité des besoins impose une répartition entre les chantiers industriels, qui prive l'État des bénéfices de la concurrence ainsi que des avantages de la construction dans un même chantier de plusieurs bâtiments identiques. Au contraire les mises en chantier à intervalles réguliers et aussi constants que possible régulariseront le travail dans les arsenaux, les chantiers et ateliers privés en même temps que les prévisions de dépense. Cette méthode apportée dans nos constructions offrira en outre l'avantage de faire bénéficier normalement nos forces navales des derniers perfectionnements. Aucune marine, sauf la marine allemande, n'a déterminé nettement l'âge limite des bâtiments de guerre. Fixée d'abord à vingt-cinq ans la durée d'existence maximum des cuirassés d'escadre a été ramenée à vingt ans par l'amendement du 6 avril 1908. C'est cette même limite de vingt années de service actif qui est inscrite dans le projet de loi soumis à votre examen. En ce qui concerne l'adoption de la date de l'ordre de construction comme origine de la limite d'âge, il convient d'observer que cette date répresente l'ancienneté du type du bâtiment, tandis que la date de l'entrée en service indique seulement l'ancienneté réelle du bâtiment. Or la dépréciation d'une unité de combat ne dépend pas tant de son usure en service que de la caducité de son type. La date de l'achèvement de l'unité de remplacement sera prévue, de façon à coïncider avec l'expiration de la durée d'existence de l'unité à remplacer.

POSITIONS D'ARMEMENT DES NAVIRES DE GUERRE.—EFFECTIFS.

Après la composition de la flotte, le point le plus important à fixer par la loi est la position d'armement des différentes unités.

Le projet de loi comporte, pour chaque armée navale, l'armement avec effectifs complets d'une escadre au moins et de la moitié des bâtiments torpilleurs. C'est un minimum au-dessous duquel il serait dangereux de descendre car si notre marine est obligée de renoncer à poursuivre une équivalence numérique qui ne pourrait être atteinte vis-à-vis de tous les adversaires éventuels, il n'en est que plus nécessaire de compenser cette infériorité par un forte préparation à la guerre, dont les principaux éléments sont un entraînement intensif des bâtiments et des équipages et la mobilisation rapide de nos forces navales.

Les éclaireurs d'escadre, sauf les unités de remplacement, doivent toujours être armés à effectifs complets. Les besoins de l'entrainement intensif de ces bâtiments à leur service spécial si délicat en font une nécessité. Quant aux bâtiments sous-marins, l'importance capitale de leur entretien minutieux, les soins constants à donner aux accumulateurs, etc., réclament en principe, l'armement à effectifs complets.

Les effectifs réduits sont déterminés de telle façon que chaque unité puisse entrer en ligne dans le plus court délai, et que le fonctionnement normal de tous les organes du bâtiment soit assuré. En particulier, le personnel des machines et le personnel canonnier ne sauraient, dans cet ordre d'idées, être reduit au-dessous des 3/5 de l'effectif de l'armement complet. Relativement au personnel des autres spécialités, la réduction peut être de moitié, mais en maintenant la proportion pour chacune d'elles et non pas pour l'ensemble seulement. A cet égard, on ne saurait trop insister sur la modification profonde qu'a entraînée, pour la composition des équipages de la flotte, la transformation des bâtiments et des armes de combat.

En plus des effectifs nécessaires pour l'armement des unités de la flotte de guerre, les prévisions budgétaires annuelles doivent comprendre d'autres groupements de personnel, qui répondent aux besoins :

Des bâtiments-écoles et, d'une manière générale, des services d'instruction et de préparation militaires et professionnelles ;

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Des bâtiments en essais ;

Des services militaires annexes, pour l'armement des bâtiments de servitude, pour les ateliers centraux de la flotte, la T. S. F. des postes du littoral, etc., et les services d'administration (cadres des dépôts, majorités générales, hôpitaux, préfectures maritimes, etc.).

Il y a lieu également de constituer une réserve d'équipages permettant de faire face aux éventualités et aux indisponibilités de toute nature. Sans parler du personnel en instruction préparatoire, il convient en effet de tenir compte des malades, des absents, en permission ou en congé, des officiers mariniers en disponibilité, des hommes en cours de voyage pour remplacements à l'extérieur, etc. . . . .

Le chiffre théoriquement prévu pour l'armement de la flotte de combat doit donc être majoré du chiffre corrélatif du personnel des équipages nécessaires pour ces besoins connexes.

Approvisionnements de la flotte.

Il a paru que la loi organique devait consacrer les bases essentielles sur lesquelles les approvisionnements de la flotte doivent être constitués et entretenus.

Munitions.

L'approvisionnement en munitions, qui représente pour le bâtiment de combat moderne une dépense considérable, comprend deux parties distinctes : le plein des soutes en service courant, dit approvisionnement normal, et le stock de ravitaillement, pour le remplacement des munitions consommées.

La loi ne peut fixer l'approvisionnement normal, même sous la forme générale d'une durée de feu, les éléments d'appréciation de cette durée étant constamment variables. Ce soin doit être laissé au Ministre.

Il n'en est pas de même pour le stock de ravitaillement, qui est fonction de l'approvisionnement normal. Depuis 1897, il est admis que le stock de guerre doit s'élever à une fois et demie le plein des soutes. Mais cette base ne peut être aujourd'hui qu'un minimum, si l'on considère les vitesses de tir de plus en plus grandes, l'augmentation des calibres rendant pour un poids de munitions donné le nombre des coups emmagasinés à bord forcément plus petit, l'accroissement des distances de combat, la non-interchangeabilité des munitions, enfin l'impossibilité de compter sur une fabrication rapide en temps de guerre des projectiles en acier.

Il serait entendu que tout l'approvisionnement d'un navire (stock de bord et stock de terre) devrait être constitué en même temps que serait construit ce bâtiment qui aurait ainsi, dès son entrée en service, la disposition de tous ses moyens de combat.

Matériel Spécial.—Approvisionnement du service courant.

La constitution rationnelle des provisions de guerre et des divers approvisionnements à réunir dès la mise en chantier et à entretenir pour le fonctionnement des organes vitaux des bâtiments de combat a une importance que les exigences des flottes modernes rendent de plus en plus grande.

La complexité des appareils moteurs et évaporatoires, des services de l'artillerie, d'électricité, etc., est aujourd'hui telle que "pour prévenir l'immobilisation du navire, en cas d'avarie ou d'épuisement des réserves à bord, il est indispensable de se pourvoir à l'avance de tout ce qu'il pourra avoir à demander à un arsenal et de tout ce que l'industrie sera alors dans l'impossibilité de lui fournir en temps utile." Faute de prévisions suffisantes, l'unité de combat la plus forte est à la merci d'un accident, peu important par lui-même et cependant redoutable si les moyens d'y parer rapidement n'ont pas été assurés.

Il y a lieu de prévoir non seulement les approvisionnements en matériel spécial et rechanges spécialisés mais aussi, pour le matériel d'emploi commun, les consommations intensives du temps de guerre, pendant lequel la navigation sera plus active, présentera plus de risques et exigera forcément plus de remplacements. Il est incontestable qu'en quelques semaines de lutte maritime les approvisionnements constitués d'après les besoins économiques du temps de paix fondront, sans qu'on puisse savoir même approximativement, pour certaines matières, quand et comment les magasins pourront s'alimenter.

En ce qui concerne les approvisionnements du service courant, les bases à adopter varieront suivant les conditions d'emploi, les facilités d'achat ou de conservation des diverses catégories de matériel.

Outillage des ports.

L'accroissement du nombre et des dimensions des unités de combat a, sur l'outillage des ports, notamment en ce qui concerne les bassins de radoub, une répercussion dont il importe de se préoccuper.

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Pour les besoins de la flotte prévue au projet de loi, 4 bassins à Brest et 4 à Toulon, 2 à Cherbourg et 2 à Bizerte seront suffisants. Ces chiffres correspondent à la proportion ($\frac{2}{10}$) admise par le Conseil supérieur, entre le nombre des bassins de chaque mer et celui des cuirassés d'escadre entrant dans la composition de la flotte.

Brest possédera 4 formes pour les plus grandes unités et Cherbourg 2 après achèvement des travaux en projet ou en cours. Il n'y a donc aucun nouveau bassin de l'espèce à prévoir dans ces ports.

Mais à Toulon, qui ne sera pourvu que de 2 grandes formes après la construction déjà décidée de la forme double Castigneau-Vauban, il faut en prévoir deux autres, et à Bizerte, qui n'en a pas encore, il faut envisager dès maintenant la construction de deux grandes formes.

En outre Lorient, port de construction, devra posséder, lui aussi, une forme pour l'achèvement des plus grandes unités après leur lancement.

D'autres travaux à entreprendre dans les ports figurent également au tableau A annexé au projet de loi. Ils sont la conséquence de l'accroissement inévitable des besoins créés par l'entrée en service des nouvelles unités de la flotte.

Programme de constructions.

Pour passer de l'état de choses actuel à la composition de la flotte telle que la prévoit le projet de loi, des mesures transitoires doivent être prises en vue d'assurer la mise en vigueur de la loi navale dans le délai le plus court possible et dans les conditions les plus avantageuses. Ces mesures ont fait l'objet d'études de détail approfondies. C'est, avant tout, sur la construction des cuirassés d'escadre que doit porter l'effort immédiat, car cette catégorie de bâtiments constitue l'élément essentiel de la puissance d'une marine. Le programme d'échelonnement des mises en chantier qui figure à l'annexe a été élaboré comme première conséquence des dispositions proposées.

Projet de loi navale.

On ne saurait soustraire l'exécution d'une loi organique de la marine, malgré sa nature spéciale, aux discussions qui précèdent le vote du budget; c'est annuellement que seront demandés aux Chambres les ressources nécessaires à l'exécution des travaux et à la constitution des approvisionnements que comporte cette loi. Les caractéristiques des bâtiments à mettre en chantier seront déterminées, après consultation du Conseil supérieur de la Marine, une année avant la date prévue pour la mise en chantier. Ces caractéristiques figureront à un état spécial annexé au projet de budget pour la Marine, chaque année, et le Parlement fixera ainsi, sur des données précises et complètes, les constructions à entreprendre ou à continuer par les arsenaux et par l'industrie. Le projet de loi navale qui vous est soumis fournira aux représentants du pays les garanties qu'ils ont depuis longtemps réclamées; mais il comporte, pour le présent, un effort financier que nous demandons à votre patriotisme de vouloir bien consentir.

Fidèles à la politique financière affirmée dans le projet de budget rectifié de 1910, nous vous proposerons de faire face aux charges nouvelles en vous demandant les crédits nécessaires dans les divers budgets ou dans des lois spéciales. Si l'on envisage les dépenses militaires de la France, de l'Allemagne, de l'Angleterre, des États-Unis et de l'Italie, on constate que la France est celle de ces cinq nations qui a le moins augmenté ses dépenses navales pendant les dix dernières années.

Le moment est venu de regarder la situation en face. Les atermoiements ne sont plus possibles, et la question se pose de la manière suivante: La France veut-elle, oui ou non, avoir une marine? Dans l'affirmative, le programme qui vous est soumis est un minimum, le réduire serait consacrer notre déchéance navale. Le Parlement a trop montré, en toutes circonstances, le souci qu'il a des grands intérêts de la défense nationale pour que le Gouvernement ne soumette pas avec une entière confiance le projet de loi ci-contre à ses délibérations.

Composition de la flotte.

La composition de la flotte est la suivante:

1° *Flotte de combat:* 28 cuirassés d'escadre, formant 4 escadres de 6 cuirassés et 4 cuirassés de remplacement; 10 éclaireurs d'escadre, à raison de 2 éclaireurs par escadre et de 2 éclaireurs de remplacement; 52 bâtiments torpilleurs de haute mer, à raison de 12 bâtiments torpilleurs de haute mer par escadre et 4 bâtiments torpilleurs de haute mer de remplacement.

2° *Flotte des divisions navales lointaines:* 10 bâtiments pour divisions navales lointaines. Suivant les besoins: Avisos et canonnières.

3° *Flotte des défenses sous-marins:* 94 bâtiments sous-marins; 4 bâtiments porteurs et mouilleurs de mines. Suivant les besoins: Dragueurs de mines.

4° *Bâtiments des services spéciaux:* 3 bâtiments hydrographes; 3 transports de côtes. Suivant les besoins: Bâtiments-écoles; Bâtiments garde-pêches.

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ANNÉES.	I.—FLOTTE DE COMBAT.										II.—FLOTTE DES NAVALES	
	CUIRASSÉS.				ÉCLAIREURS.		BÂTIMENTS TORPILLEURS.				GRANDS BÂTIMENTS.	
	Mises en chantier.		Entrées en service.		Mises en chantier.	Entrées en service.	Mises en chantier.		Entrées en service.		Mises en chantier.	Entrées en service.
	Accroissement.	Remplacement.	Accroissement.	Remplacement.	Remplacement.	Remplacement.	Accroissement.	Remplacement.	Accroissement.	Remplacement.	Remplacement.	Remplacement.
1910	1	1 R. Brennus	..	..	..	..	8	..	..	..	..	..
1911	2	..	..	..	..	..	..	..	..	..	..	..
1912	..	2 R. Carnot, Charles Martel	6	..	..	..	..	3 (A) Baliste, Bélier, Arquebuse	..	..	..	..
1913	1	1 R. Jaurégui-berry	1	1 R. Brennus	..	..	..	..	..	..	..	..
1914	..	2 R. Bouvet, Masséna	2	..	..	..	..	..	..	3 (A)	..	..
1915	..	2 R. Charle-magne, St. Louis	..	2 R. Carnot, Charles Martel	..	..	..	2 R. (B) Claymore, Obusier	..	..	..	..
1916	2	..	1	1 R. Jaurégui-berry	..	..	..	..	..	..	..	..
1917	..	1 R. Gaulois .	..	2 R. Bouvet, Masséna	2 R. Marseil-laise, Jurien de la Gravière	..	..	3 R. (C) Pierrier, Stylet, Tromblon	..	2 (B)	..	..
1918	..	..	..	2 R. Charle-magne, St. Louis	2 R. Jules Ferry, Amiral Aube	..	..	..	..	..	..	..
1919	..	1 R. Suffren .	2	..	2 R. Victor Hugo, Léon Gam-betta	..	..	4 R. Carquois, Trident, Mortier, Fleuret	..	3 (C)	..	..
	6	10			6	..	8	12				
	16				6		20					

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DES MISES EN CHANTIER.

DIVISIONS LOINTAINES.		III.—FLOTTE DES DÉFENSES SOUS-MARINES.				SITUATION DE LA FLOTTE.						
MOYENS BÂTIMENTS.		SOUS-MARINS.				I.—FLOTTE DE COMBAT.			II.—FLOTTE DES DIVISIONS NAVALES LOINTAINES.		III.—FLOTTE DES DÉFENSES SOUS-MARINES.	
Mises en chantier.	Entrées en service.	Mises en chantier.		Entrées en service.		Cuirassés.	Éclaireurs.	Bâtiments torpilleurs.	Grands bâtiments.	Moyens bâtiments.	Bâtiments torpilleurs garde-côtes.	Sous-marins
Remplacement.	Remplacement.	Accroissement.	Remplacement.	Accroissement.	Remplacement.							
..	..	tonnes. 1 de 700	..	tonnes. 11 { 3 de 700 8 de 400 }	..	16	10	44	10	..	100	{ 45 + 11 = 56
..	..	1 de 700	..	12 { 11 de 400 1 de 300 }	..	16	10	44	10	..	100	{ 56 + 12 = 68
..	..	{ 1 de 700 3 de 700 }	6 (A) { Français, Algérien, Follet, Castor, Loutre, Souffleur }	7 de 400 1 de 700	..	{ 16 + 6 = 22 }	10	{ 44 + 8 = 52 }	10	..	100	{ 68 + 8 = 76
..	..	4 de 700	..	1 de 700	..	{ 22 + 1 = 23 }	10	52	10	..	100	{ 76 + 1 = 77
..	..	4 de 700	..	{ 1 de 400 3 de 700 }	6 (A)	{ 23 + 2 = 25 }	10	52	10	..	95	{ 77 + 4 = 81
..	..	3 de 700	3 (B) { Dorade, Otarie, Phoque }	4 de 700	..	25	10	52	10	..	85	{ 81 + 4 = 85
..	..	2 de 700	3 (C) { Méduse, Ludion, Naïade }	4 de 700	..	{ 25 + 1 = 26 }	10	52	10	..	60	{ 85 + 4 = 89
..	..	..	7 (D) { Bonite, Thon, Oursin, Truite, Alose, Anguille, Grondin }	3 de 700	(B)	26	10	52	10	..	60	{ 89 + 3 = 92
..	..	..	8 (E) { Sirène, Triton, Silure, Espadon, Aigrette, Cigogne, Émeraude, X . . . }	2 de 700	3 (C)	26	10	52	10	..	45	{ 92 + 2 = 94
..	..	..	4 (F) { Opale, Rubis, Oméga, Saphir }	..	7 (D)	{ 26 + 2 = 28 }	10	52	10	..	45	94
		19	31									
		50										

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THE STATE OF THE NAVY.

By Lord Brassey, G.C.B.,
Lord Warden of the Cinque Ports.

Address delivered in the City Hall, Cape Town, December 22nd, 1909.

Mr. J. W. Jagger, M.L.A., presided over a crowded gathering in the Banqueting Chamber, and had with him on the platform Messrs. B. K. Long, M.L.A., M. Alexander, M.L.A., Ludwig Weiner, George Smart, L. MacLean, W. E. Moore, P. Ryan, W. J. Thorne, and Dr. Aderne Wilson.

On the conclusion of the address a resolution regarding South Africa's connection with the Navy was unanimously and enthusiastically carried.

The Truth About the Navy.

The Chairman, in introducing Lord Brassey, said they were specially privileged in having his lordship to address them on the subject of the Imperial Navy. They would hear the truth as regarded the state of the Imperial Navy.

An Awakening Throughout the Empire.

Nor need he (the Chairman) remind the audience that during the last twelve or eighteen months there had been a great awakening as to the responsibility of the outlying parts of the Empire for the maintenance of the Navy. Canada and Australia had awakened to a sense of their responsibility in regard to the upkeep and maintenance of the British Navy as part of the defensive forces of Great Britain. They in South Africa had always in some little degree recognised their own obligations in that respect, by contributing for some years a matter of £50,000 annually to the Navy—a small enough sum, he would admit. Natal contributed something like £35,000, but latterly, while other colonies had been giving their attention to naval matters, the attention of South Africa had been taken up with the affairs of the Union of South Africa. At the last Conference in London this year the delegates were not able to bring forward any scheme for the defence of South Africa because Union had not been completed.

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South Africa's Share.

He had not the slighest hesitation in saying that one of their first duties under a Union Government would be to take in hand the defence of South Africa. (Hear, hear.) They must look upon the cost of the Navy as an insurance of their external trade. Well, the Estimates for the Navy in Great Britain for this year would amount to something like £35,142,000, or £3 12*s.* per cent. of the total external trade of Great Britain, inward and outward. Applying that basis to South Africa, which last year had a total trade of £72,000,000, imports and exports, instead of contributing, as they now did, £85,000 a year, they would be contributing something over £2,500,000 a year toward Imperial naval defence alone. That was on a £3 12*s.* basis. (Hear, hear.) Or let them take it as a contribution per head of the population. In Great Britain it amounted to 15*s.* 9*d.* per head—he meant the cost of the Navy alone. Applying that to the white population here, and leaving out the native and coloured people, instead of contributing £85,000 they would contribute £893,000 a year. (Hear, hear.)

State of Affairs not to Last.

Great Britain could not be allowed to carry the total cost of the maintenance of the British Navy. South Africa was a nation that had just laid its foundations for the future, and if they had any self-respect they could not allow such a state of affairs to continue. (Hear, hear.) With them the matter of naval defence was as important as it was to Great Britain herself. This country was doing a trade of £72,000,000 a year, of which £6,000,000 was for food-stuffs and drink alone, whilst £1,250,000 was for bread-stuffs—flour and wheat.

Round their coast was the great open highway from west to east —to India—and in case of war, with the Suez Canal closed, there was little doubt that almost one-sixteenth of the total trade they had would have to go round by way of the Cape. The Cape held the most important strategic position in the southern hemisphere. He mentioned these facts to show them the importance of naval defence to them in South Africa. It was as vital to them as it was to Great Britain itself. (Cheers.)

Lord Brassey's Address.

Lord Brassey said: I am here by request of the Cape Town branch of the Navy League. Its members have been troubled by pessimistic writing and speeches. I am not here as an alarmist, nor

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yet as a wild man. We do not advance the cause we have at heart by pressing unreasonable demands.

I entered Parliament at a period when Lord Beaconsfield and Mr. Gladstone were the leaders of parties. Differing widely on general politics, they were fully agreed in this—that it is the duty of a statesman to give his country in time of peace the blessing of light taxation. I have not departed from the creed in which in the days of my youth I was instructed.

Let us not make unreasonable demands for the Navy. In naval preparations we do not look to the great Republic of the West. Great Britain and the United States are separated by the wide waters of the Atlantic Ocean. We have no cause for quarrel. All our trade relations are for the mutual benefit. The supplies of food and raw materials, such as cotton, which Great Britain draws from the United States are indispensable. There is a racial sympathy binding together Teuton and Briton, just as here in South Africa Briton, Dutchman, and Huguenot are happily in the process of binding themselves together into one united and powerful nationality. And though Germany is selected as a Power with which we compare, it is not because there is cause or probability of war. We do not forget that we have stood together shoulder to shoulder in some of the greatest battles which history records. In trade we are rivals. It is a generous rivalry in doing service to mankind.

And now let us turn to navy estimates. With equal efficiency of administration naval strength should be proportionate to expenditure.

NAVY ESTIMATES, 1908–10.

	Great Britain. £	Germany. £
1909–10	35,142,700	19,538,188
1908–09	32,319,500	16,596,561
	plus £2,823,200	plus £2,941,627

EXPENDITURE ON SHIPBUILDING, 1909–10.

	Great Britain. £	Germany. £
Shipbuilding . . .	9,300,000	7,000,000
Armaments . . .	1,500,000	3,000,000
Torpedo flotilla . .	500,000	400,000
	£11,300,000	£10,400,000

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In the last three years Germany has made a vigorous effort, and chiefly in shipbuilding. To maintain a two-Power standard it would be necessary to lay down two keels to one. Taking into view our superiority in completed vessels, a laying-down programme of six Dreadnoughts annually for the British Navy should be deemed sufficient. Increase or relaxation of effort on our part must depend on information which the Admiralty alone possessed. They were responsible to the Parliament and the country for the adequacy of our preparations. Parliament had authorised the laying down of four ships in the present financial year, and four ships on April 1st next. There may be a further laying-down programme. In 1910–11 the provision for the increased construction authorised by the British Parliament must involve a large addition to the Estimates.

Having seen how we stand as to naval expenditure at the present time, let us now take a retrospective view. Powerful navies could not be created by one Ministry or by one Parliament. "On n'improvise rien en marine." The state of the Navy depended on the policy and the resolve of the nation. Let them take the last ten years. The comparison was very interesting. Aggregate Navy Estimates for the five years, 1900–04: Great Britain, £167,700,000; Germany, £49,000,000. Five years, 1905–09: Great Britain, £165,950,000; Germany, £75,250,000. Looking back over the last ten years, the British naval expenditure very largely exceeded, and to-day was practically double that of Germany. Unless there had been in the last ten years incapable administration at the British Admiralty we must be far ahead. Let us not say that British naval administration had been incapable. They had sent some of their best men to the Admiralty. In recent years Lord George Hamilton, Lord Goschen, Lord Spencer, Lord Selborne—(cheers)—a pillar of the Empire—and Lord Cawdor had held high office as First Lords. The First Sea Lords had been chosen from the most distinguished seamen. Among those who have served in recent years we recall Sir Frederick Richards, Lord Walter Kerr, and Sir John Fisher. The capacity of those officers had never been questioned. What had been accomplished with that large excess of expenditure which Parliament had voted? They had pushed forward shipbuilding. They were strong in Dreadnoughts. They had created a mighty Armada of pre-Dreadnought battleships and cruisers, still to be reckoned an effective force. They had more than a twofold superiority in men; they had spent vast sums on their sea training. They had their magnificent dockyards with their legions of men skilled in building and fitting of ships, and they had a chain of strongly fortified and perfectly equipped naval stations along the whole length of the line connecting Britain with the Far

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East. Here, in South Africa, the Admiralty had been creating a naval establishment of the first class at Simon's Bay. It had cost millions of money. It was a naval asset of the first importance. In peace the stream of trade to and from the East had been diverted to the Suez Canal. In war the long sea route of the elder day, as the most secure from interruption, would be much frequented. There was need for further and sustained effort, especially in shipbuilding. There was no ground for pessimistic reviews. In trusting to the British Navy they were not leaning on a broken reed. (Cheers.)

Having given the total amount of Naval estimates, let us turn to the principal votes. Manning: Numbers voted for the manning of the Navy in 1901–10: Great Britain, 128,000; Germany, 54,000. Battles, as Admiral Custance has truly said, are won by men and not by ships. How true that saying is was conspicuously attested in the recent conflict in the Far East. Japan went into war inferior in numbers of ships and men. Their naval expenditure had been but a fraction of that incurred in Russia. We know the result. Training for the hard profession of the Navy is a work of years. Here, certainly, the British Navy has the advantage over any Navy manned by men recently enrolled and for short service. Never has the training of the British Navy been carried out with a stronger resolve at any cost of pains and labour to secure efficiency than we displayed to-day.

Training at sea is essential to the efficiency of the Navy. We maintain a force of ships in commission far in excess of a two-Power standard. The ships in commission under the German flag are concentrated in Home waters. The fleet consists of sixteen battleships, none exceeding 13,000 tons. There are nine cruisers, of which three are of the armoured type. Turn to our ships in commission in the British Navy:—

Foreign stations (India, China, Australia, Cape, Pacific): Four armoured cruisers, five large and seventeen protected cruisers, ten gunboats.

Mediterranean: Six battleships; four armoured, two large, two smaller protected cruisers.

Atlantic: Six battleships; seven armoured, two large protected cruisers.

Home Fleet: Fully manned—sixteen battleships, including four Dreadnoughts, taking the Lord Nelson and Agamemnon as Dreadnoughts; seven armoured, four large, six smaller protected cruisers, including four scouts; forty-eight destroyers; thirty-two submarines; and eleven auxiliary vessels. Manned with three-fifths complements (fully manned for manœuvres)—eight battleships; ten armoured, three large, seven small protected cruisers; eight torpedo-gunboats.

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Manned with four-fifths complements—one hundred destroyers.

With so large a force of ships in commission the British Navy has unrivalled means of training.

And now let us examine the state of the Navy as to ships. And first the collective strength is given in the German *Naval Annual* as under:—Ships launched in 1892 or later: Battleships over 10,000 tons—Great Britain, 56 ships, 859,000 tons; Germany, 25 ships, 380,000 tons. Armoured cruisers over 5000 tons—Great Britain, 39 ships, 495,000 tons; Germany, ten ships, 112,000 tons. The aggregate tonnage of both sides includes ships which will not long remain on the list of effectives. Every vessel must be deemed capable of doing service until condemned as obsolete.

Naval supremacy depends essentially on strength in the line of battle. The Dreadnoughts are the successors of the three-deckers of the elder day.

DREADNOUGHTS AND DREADNOUGHT CRUISERS.

DATES OF COMPLETION.

	GREAT BRITAIN.			GERMANY.		
Year.	Battleships.	Armoured Cruisers.	Total.	Battleships.	Armoured Cruisers.	Total.
1909	8 Including Lord Nelson, Agamemnon, St. Vincent, Collingwood	3	11	2	–	2
1910	10 Including Neptune	4 Including Indefatigable	14	4	1	5
1911	14 Including two ships laid down in July, 1909	4	18	7	2	9
1912	20 Including four ships contingent programme and ships given by Australia and New Zealand	5 Including new cruiser, 20,000 tons	25	10	3	13

In 1912 the British Navy will be up to a two-Power standard in Dreadnoughts. We should have twenty battleships completed, including the Lord Nelson and Agamemnon, and five Dreadnought cruisers. At the same date Germany will have completed ten battleships and three cruisers.

Criticisms on the British Naval Administration in the pages of the Navy League *Annual* are seldom sparing. The editor, in the

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latest issue of the *Annual*, commends our first Dreadnoughts as a homogeneous squadron of magnificent and powerful battleships. He holds that the first four German Dreadnoughts cannot be considered the equals of the British ships. Our Dreadnoughts have more than fulfilled the highest demands made or expectations formed of their fighting efficiency. They steam 21½ knots. In armour and armament they are second to none. Costs of construction for the Dreadnought class are less in England than elsewhere.

In pre-Dreadnoughts we are very strong. The large excess of expenditure for the British Navy in former years has given us that noble fleet of pre-Dreadnought battleships and cruisers which should certainly not be excluded in estimating our position as we stand to-day. We might have been stronger, at least for certain subordinate but essential services, if we had been less ruthless in the scrapping of ships.

It is not necessary to enter into details as to cruisers. We have a commanding superiority in these classes. We have a vast commerce to protect.

In destroyers, Germany runs us close. We are building on both sides as far as is prudent having regard to the increasing improvements of type.

We have reviewed the position. We have seen that as we stand to-day our naval supremacy is fully assured. We have to maintain that position by further efforts. The resources of Great Britain are immense; in relation to the demands of the Navy they may be described as inexhaustible. Speaking as an old Parliamentary hand, I confidently give the assurance that the British Empire will never be left without naval defence through the refusal of Parliament to vote the necessary supplies.

While resolved, if need be, to bear the whole charge, we value not the less the co-operation of the colonies in Imperial defence. The patriotic efforts which have come from Australia and New Zealand to give Dreadnoughts to the Imperial Navy have been gratefully accepted. In undertaking to provide the naval force for local defence our fellow-subjects beyond the seas are relieving the British taxpayers of some portion of the heavy burden they have to bear. More than this, they are showing to the world in the most impressive manner the solidarity and unity of the Empire.

While we do not look for similar action in South Africa, it is not unfitting to recall that your prosperity depends on the security of your communications across the sea. Nor would your political independence be assured without naval protection. It is to sustain your confidence in the greatness, the power, and the policy of the British

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Empire that I am here to-day. British statesmanship harbours no aggressive designs. It is generous in all dealings with commerce. Its aim is peace with honour. Our fellow-subjects in all parts of the Empire are as brethren to the British people. In South Africa every franchise, every guarantee, every liberty and freedom is shared in full citizenship by Dutchman and by Briton. If need were, we in England are resolved to shed the last drop of our blood in your defence.

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